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TUMORS OF THE BLADDER WITH SPECIAL REFERENCE TO THE TECHNIQUE AND POST-OPERATIVE RESULTS

A SYMPOSIUM[1]

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TECHNIQUE OF OPERATIVE TREATMENT OF BLADDER TUMORS

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TUMORS of the urinary bladder are either *primary* or *secondary*. In the latter class are noted such growths as occur by surface implantation extension, descending from the renal pelvis,[2] and bladder invasion by contiguity from carcinomata of the prostate, and of the abdominal and pelvic viscera. Primary vesical neoplasmata are either *benign* or *malignant*. The benign types include papilloma, angioma, fibroma myoma, adenoma, and cyst. The malignant tumors are carcinoma, sarcoma, and myxoma.

Reference to these various types is made by virtue of the necessity of a knowledge of intravesical gross pathology respecting their differentiation when possible, cystoscopically, thereby determining the proper form of treatment, and if operative, the appropriate procedure. The more experienced the cystoscopist and the greater his knowledge of living pathology, the more often will his opinion be correct. In view of the deservedly popular and best form of treatment of benign growths or papillomata by endovesical high-frequency electro-coagulation, as opposed to the radical partial resection of the bladder for malignant tumors involving the bladder-wall, and particularly in view of the fact that papillomata and carcinomata comprise at least 90 per cent of vesical neoplasmata, the information yielded and the deductions permissible from cystoscopic examinations in these cases is a matter of first magnitude, and in the vast majority of cases the most important factor in the determination of the proper form of treatment. In 22 consecutive cases that I have observed, 45.4 per cent were inoperable, from the standpoint of cure, when first seen; that is, the diseased area was extensive, unmistakably carcinomatous, and in an advanced state. In 22.7 per cent the character of the growth was indeterminable at the time of first cystoscopy, but in only 9 per cent was such the

[2] A noteworthy example of such a condition is that described by Zuckerkandl in a classical case in which autposy revealed the ureter and bladder lined and literally filled with small secondary papillomata, obviously implanted from the large mother tumor situated in the pelvis of the kidney.

[1] Papers presented at the annual meeting of the American Urological Association, Baltimore, April 13–15, 1915.

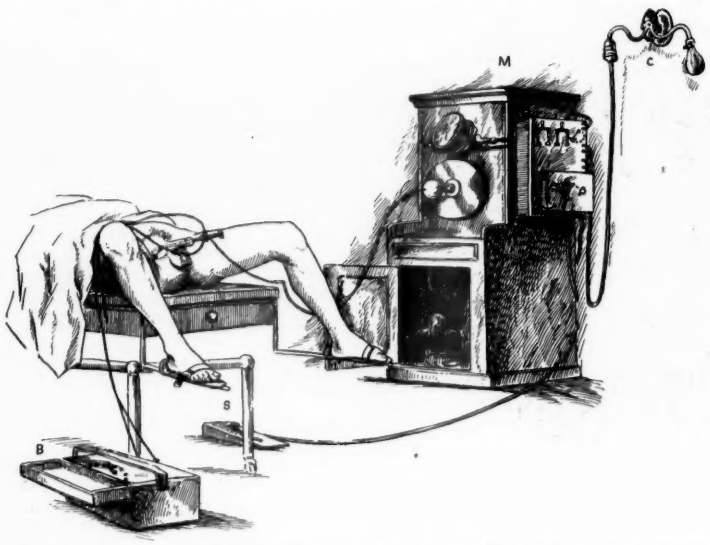

Fig. 1. Arrangement for high-frequency destruction of bladder tumors. C, street current; M, high-frequency machine; B, battery for illumination of cystoscope; S, foot switch to facilitate the "make and break" of the Oudin current.

case after two or three probationary high-frequency endovesical applications. This experience and these figures are based upon the operative findings, the post-operative clinical course of cases, and in most instances the histopathological examination of removed tissue.

Be it understood, in consideration of the above statements, that theoretically, and indeed practically in any given case, no cystoscopist, no matter how experienced, can surely state that a particular vesical growth is papilloma or carcinoma. Even though his opinion be correct in 90 per cent of cases, it is merely inferential. The microscope alone can determine the diagnosis absolutely. I have repeatedly observed papillomata undergoing carcinomatous degeneration of their projecting surfaces, and in these cases it is merely a question of time until the pedicle likewise becomes involved, unless appropriate treatment be instituted. Such a carcinomatous degeneration is amenable to treatment by high-frequency electro-coagulation, and may be cured along with its papillary pedicle. On the other hand, so soon as the pedicle becomes involved, similarly to carcinoma of the sessile type, there is but one form of treatment, if the patient be seen in the operable stage, and that is by resection of the bladder, transperitoneally or extraperitoneally. In doubtful cases a very few high-frequency applications will settle the point, and, if no definite beneficial effect be manifest, should decide the question at once in favor of a radical operation. In this connection I desire again[1] to protest against the routine practice of removing, per urethram, sections of tumors for microscopical diagnosis prior to surgical intervention. The predisposition of this procedure to invite implantation of tumor-cells and recurrence, far outweighs any advantage from the diagnostic viewpoint. In full realization of the poor results generally in the past in operations for bladder tumors, and on account of the great likelihood of recurrence, it behooves us to avoid incisional forms of treatment whenever possible; that is, when the tumor is a papilloma. I deplore exceedingly the term "malignant papilloma," and believe that such terminology is responsible for no little confusion and misunderstanding rela-

[1] The destruction of tumors of the urinary bladder by a high-frequency current effect, known as desiccation. Surg., Gynec. & Obst., 1912, xiv, 315.

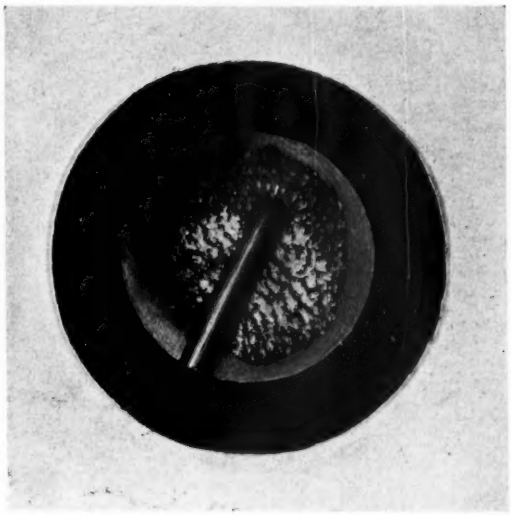

Fig. 2. Showing the manner of application of high-frequency electrode to bladder papilloma. This represents the appearance of a tumor one week after first treatment by the Oudin current; the white area is the coagulated, desiccated or dead tissue, the result of the first treatment; the electrode is seen imbedded in the remaining living tissue, preparatory to the second treatment.

Fig. 3. Cystoscope constructed with capsule in beak for carrying radium for topical intravesical applications (after Paschkis).

Fig. 4. Author's instrument used for endovesical applications of radium. The graduated shaft is a woven-shotted bougie and therefore flexible. Its tip is fitted with a silver capsule, S, one millimeter in thickness. Surrounding this is a lead cover, L, one and a half millimeters thick, provided with an oval fenestrum permitting the emanation of the effective radium rays. After cystoscopy, by careful manipulation, it is possible to bring the diseased area in close apposition with the fenestrum and conduct cross-fire emanations.

tive to the proper treatment of many vesical tumors. So soon as a papillary growth evidences a marked breaking through of the epithelial cells and an infiltration of round cells at the base, it is assuredly malignant and no longer a papilloma, and should be classed as a carcinoma and subjected to formidable treatment. I have never seen a case of true papilloma, whether single or multiple, that was not destroyed effectively by high-frequency electro-coagulation, and I have never seen a single case of carcinoma involving the pedicle or bladder-wall that was cured by the electric spark. A papilloma is always a precancerous tumor, and therefore, in accordance with the old definition, malignant. On the contrary, histologically, a papilloma is no more a malignant growth than a common seed-wart. If we were more precise in the differentiation of these bladder tumors, I believe a forward step might be taken in the selection of the best method of treatment for each individual case.

The treatment of tumors of the urinary bladder is dependent upon a number of factors, chief of which are: (1) the organic integrity of the individual, namely, cardio-vascular disease, nephritic changes, etc.; (2) the extent of disease, often manifested by infiltration and induration about the base of the bladder on rectal and vaginal examination, or by evidence of vesical metastasis; and (3) the cystoscopic revelations, defining the number, size, character, and location of tumors, and consequently in most cases the nature of the surgical procedure to be adopted. Due consideration of these factors will readily permit of a decision between high-frequency electro-coagulation and radical operation, or relegate the case to some unfortunate palliative procedure, as suprapubic cystostomy, exclusion of the bladder either by bilateral nephrostomy or ureteral transplantation, or radium emanations.

The treatment of bladder tumors may be considered under two chief forms: *non-incisional* and *incisional.*

Non-incisional forms of treatment. Under this heading may be enumerated: (1) high-frequency electro-coagulation, (2) radium, (3) perurethral excision, snare strangulation and cauterization, and (4) irrigations with coagulable solutions. Preëminent among

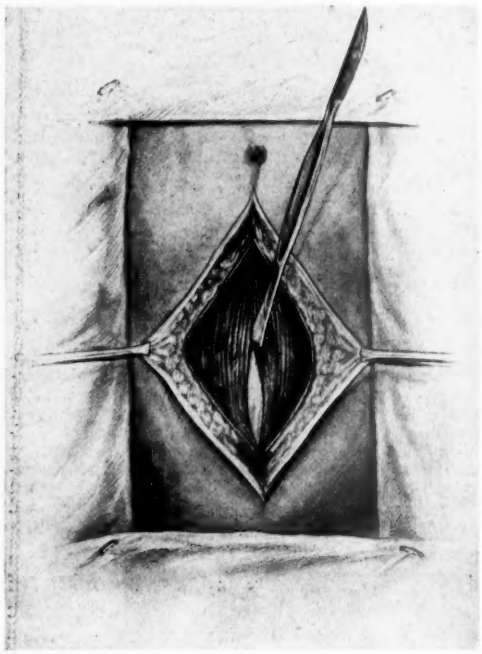

Fig. 5. Vertical median incision from symphysis to umbilicus, showing separation of recti muscles by blunt dissection.

these stands the first, particularly in the treatment of vesical papillomata or benign growths.

Technique of high-frequency electro-coagulation. The instrumentation is precisely that employed for ureteral catheterization. It is advisable to use a double catheterizing cystoscope of the Brown-Buerger type. The advantage of employing two (instead of one) specially insulated wire cables, constructed so that they may be introduced through the catheter channels of the cystosope, is that it makes it unnecessary to withdraw so frequently the electrodes in order to clip off their tips, which, as a result of the current, have the insulation melted from them and become welded, as it were, to the tissue in the areas of the tumor treated. So firm is this welding at times that the entire growth can be freely moved on its pedicle by the cable, which requires a considerable pull to free its tip from the tumor, removing at the same time portions of tissue which may be utilized for microscopical study. The insulated electrode attached to the Oudin resonator[1] and terminal of a high-frequency apparatus is passed through the catheterizing cystoscope and its tip made to invaginate the surface of the growth, preferably the pedicle if visible (this is usually not the case), and the electrical current allowed to pass, "make and break," best controlled by a foot switch (Fig. 1). The spark gap between the poles of the condenser should be from 1 to 3 mm. in length; the longer the spark the stronger the current. The best gauge of the proper strength is obtained by observing the effect on the tumor. The application should not be painful, or at least not unbearably so. No spark should be visible. The immediate effect is the production of small bubbles of hydrogen gas, seen to rise through the liquid content of the bladder from the point of application of the electrode. This is followed by a blanching of the tissue, due to dehydration or coagulation, resulting in complete

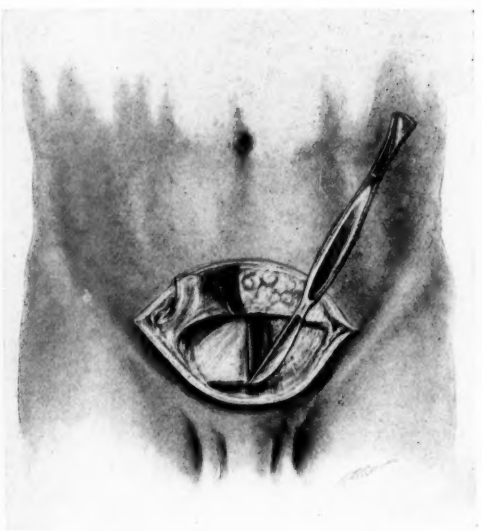

Fig. 6. Semilunar transverse incision, showing severance of recti muscles.

[1] Instead of the Oudin current, as originally suggested by Beer for this purpose, some operators prefer the d'Arsonval current, in the use of which one electrode is placed under the patient's back, the other, as in the method here described, passing through the cystoscope into the bladder.

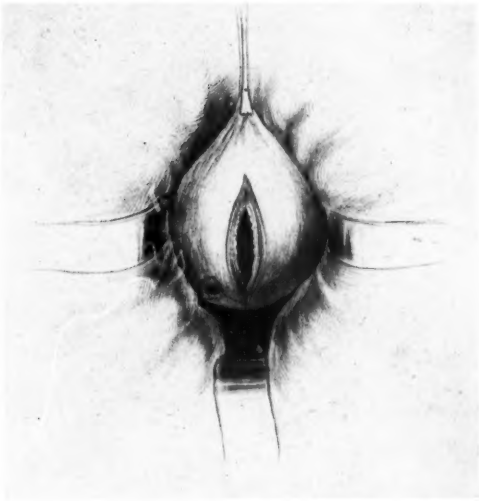

Fig. 7. Bladder pulled forward and incised vertically through its peritoneal covering. The dotted lines show the relationship of subsequent cuts to the tumor.

devitalization (Fig. 2). The dead tissue sloughs away in a few days. Treatments should be given not oftener than twice a week, usually weekly, and frequently at intervals of two or three weeks, depending upon the amount of cellular reaction produced. Great care must be exercised not to desiccate the normal bladder-wall, otherwise perforation might be readily produced. A general anæsthetic may be employed, but has never been necessary in our experience.

Technique of the application of radium. Thus far the sphere of the utility of radium in the treatment of bladder tumors has been largely and should be restricted to inoperable malignant growths, and as a post-operative prophylactic against recurrence. There is no evidence to warrant its substitution for other established and well-recognized methods of treatment for operable benign or malignant neoplasmata. Paschkis and Tittinger in 1910 treated successfully a case of sarcoma of the prostate, and the former, the following year, reported on a number of cases of carcinoma of the bladder and prostate, also one of papilloma. The results were poor, due probably to the employment of insufficient radium.

Through the courtesy of Drs. Charles H. Frazier and Henry K. Pancoast of the University Hospital, I have utilized radium in two cases to supplement surgical procedures. In each case, approximately 110 mg. of radium sulphate or 50.5 mg. of the element radium were employed. Preferably, in extensive inoperable tumors it is best applied through a suprapubic vesical opening, imbedding the capsule in the pathological tissue at various sites for the sake of cross-fire. The capsule, enclosed or not in a rubber tube or catheter, is allowed to remain in one position for two to twenty-four or more hours. The emanations may also be applied to bladder lesions through the urethra. This may be effected with a cystoscope carrying the element as was done by Paschkis (Fig. 3), or especially in cases of involvement of the neck by the careful manipulation of a carrier (Fig. 4) after previous determination by cystoscopy of the exact location of the growth. Possibly in the future, with the employment of enormous dosage, taking care to cut off all but the gamma and deep-penetrating rays, the dura-

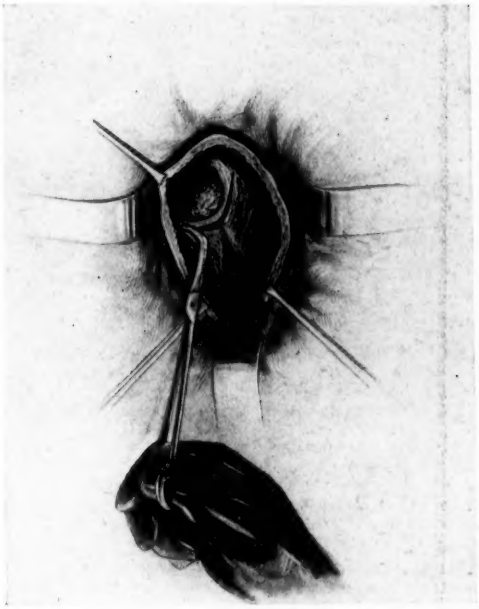

Fig. 8. Exposure of the tumor from the inside, demonstrating the manner of circumcision of the growth.

Fig. 9. Showing appearance of the bladder after excision of tumor-bearing area involving the distal end of the ureter. The latter has been reimplanted through a stab in the bladder-wall.

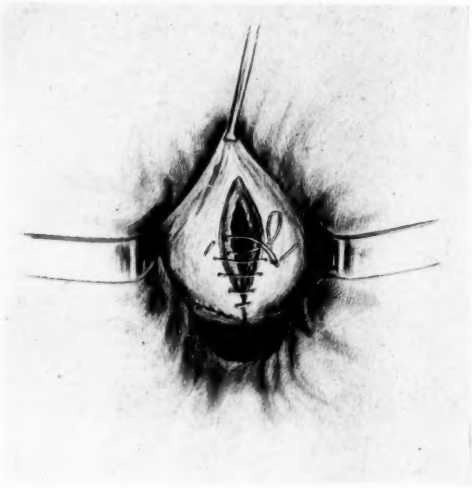

Fig. 10. Illustrating manner of suture for closure of the bladder. Observe that the Connell suture is modified to exclude the mucosa, instead of passing through all the coats of the bladder. A running mattress suture of linen through the peritoneum usually supplements and reinforces the primary deep suture.

tion of treatment may be shortened and its effectiveness greatly increased. It will be remembered, however, that radium cannot supersede surgery.

Perurethral excision, snare strangulation, and cauterization. These comprise endovesical operative procedures introduced by Nitze and practiced by a few expert cystoscopists. From the standpoint of treatment today, they are obsolete as contrasted with the superior advantages of high-frequency electrocoagulation. Diagnostically it is rarely permissible or necessary to excise, punch out, or snare off a portion of a bladder tumor. Should it be found advisable to resort to this procedure in a given case, Buerger's operating cystoscope, employing the cutting or punch forceps or Young's cystoscopic rongeur, will serve the purpose admirably. Such methods invite implantation metastasis and should be condemned as routine practices. The technique is precisely that for cystoscopy and needs no description at this time.

Irrigation with coagulable solutions. The idea, that by irrigation of the bladder with certain medicated solutions supposed to exert a coagulating influence on tumors and hence their disappearance, is exploded. However, following the removal of vesical neoplasmata, it is still permissible, if not advisable, to practice prophylactic irrigations, thereby preventing recurrences from stray tumor-cells. The best solution for the purpose is resorcin in 2 to 10 per cent strength, begun as soon as expedient after operation and continued at semiweekly intervals for two or three months.

Incisional forms of treatment. The operative treatment of bladder tumors, referring particularly to carcinoma, is one of the most difficult in surgery. This is due, first to the inaccessible location of the majority of vesical tumors, and second to the difficulties encountered in preserving the ureterovesical relationship, necessitating in many cases abnormal derivation of the urine. The operative treatment may be either *radical* or *palliative*, dependent upon the decision as to whether or not the tumor is completely excisable and the condition of the patient warrants a formidable operation. The forms of radical treatment are two: (1) *partial*

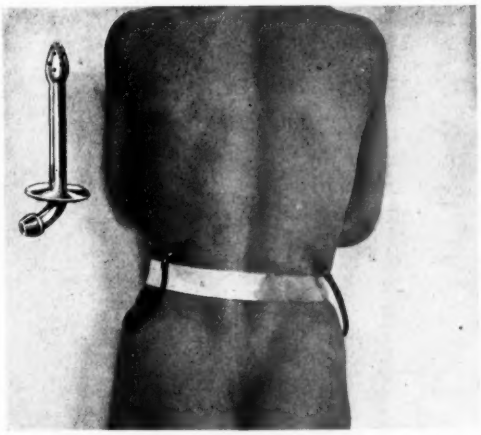

Fig. 11a (at left). Illustrating apparatus for renal drainage. The nephrostomy wounds are permitted to granulate around sterling silver tubes constructed as shown in sketch. If phosphatic deposits form in the tubes, necessitating their removal, the bulbous extremities must be cut off and the tubes held in position by adhesive plaster. Light rubber tubing conducts the urine around the flanks to a reservoir suspended in the hypogastric region.

Fig. 11b, same as 11a, front view.

cystectomy and (2) *total cystectomy*. The choice between the two obviously depends upon the extent of vesical involvement by the tumor; if both ureteral orifices or the neck of the bladder be involved, the only operation offering a prospect of cure is the complete removal of the bladder. Irrespective of the high mortality (10 to 20 per cent for partial and 45 to 60 per cent for total cystectomy), I feel that the doctrine — too commonly expressed in cases of carcinoma regardless of conditions — of performing cystotomy for drainage and letting the patient die under morphine narcosis, is not only derogatory to advancement in vesical surgery but positively erroneous in many instances. Undoubtedly in the past surgeons have refused or feared to attack the bladder boldly, as they do other organs, notably the stomach, and have been content simply to open the bladder and curette or cauterize the tumor-mass. Such practices often add insult to injury, invite rapid growth of the tumor with extensive metastasis, and leave the patient worse off than before surgical intervention. If a definite, though formidable, operative procedure be planned at the outset, having in view resection or even complete removal of the bladder, extraperitoneally or intraperitoneally, necessitating in the majority of cases reimplantation of one or both ureters, I believe that we can cure a certain number of patients with carcinoma of the bladder, who otherwise are pronounced incurable and soon become human derelicts.

Partial cystectomy. This operation may be done by either of two routes: (1) *intraperitoneally* or *transperitoneally* and (2) *extraperitoneally*. Choice as to the particular route in a given case is often dependent upon the revelations of cystoscopy, that is, the exact location, size, and character of the growth. Certainly if the tumor (carcinoma) be situated in that part of the bladder covered by peritoneum, it is always advisable, if not obligatory, to open the peritoneal cavity. The operator may then determine whether or not the peritoneum, lymphatics, liver or other abdominal viscera have been involved by the growth. If the first be true a wide block resection of the entire bladder-wall and overlying peritoneum will be necessary; if metastasis has occurred a formidable vesical operation will prove useless and should not be done. With such pathological conditions present, it is obvious that an extraperitoneal operation, other than as a palliative cystotomy for drainage, would be not only erroneous,

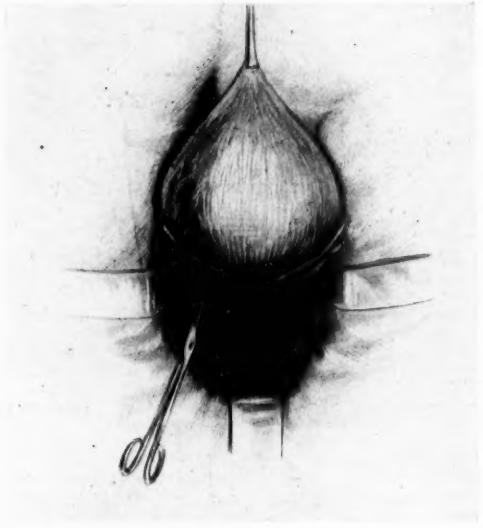

Fig. 12. Simple extraperitoneal total cystectomy. The bladder is forcibly pulled anteriorly and downward over the pubes. The vasa deferentia and ureters are shown ligated and the scissors are freeing the vesical neck preparatory to severance.

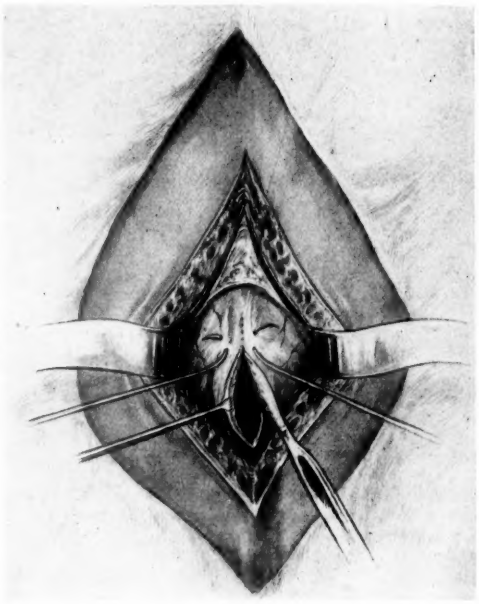

Fig. 13. Illustrating method of opening the bladder through suprapubic extraperitoneal incision.

but leave the patient worse than if no surgical intervention at all had been attempted. Thus, all things being equal, in view of the proved facts — (1) that normal urine is but slightly irritating to the peritoneum and unlikely to lead to infection as demonstrated by the reported recoveries after intraperitoneal rupture of the bladder, (2) that transperitoneal cystostomy can be successfully accomplished, even in the presence of severe cystitis, and (3) that the mortality, following the intraperitoneal route is less than half that following extraperitoneal resection — the writer strongly favors surgical attacks on the bladder, differing in nowise from those commonly practiced on the stomach. Such is the transperitoneal resection of the bladder as suggested by Rydygier, performed by Harrington, and popularized by Mayo.

The *technique* of transperitoneal partial cystectomy is as follows: The bladder is thoroughly lavaged with some solution, as boric acid or silver nitrate. This can be done through the sheath of a cystoscope, supplemented when possible by bilateral ureteral catheterization. The catheters may be serviceable in locating the ureters as they course through the pelvis to the bladder, but chiefly in preventing peritoneal contamination, while the bladder is being resected, by permitting no leakage of urine into the bladder. If the bladder has been distended with fluid, it must be emptied before it is incised.

A vertical median incision, extending from the symphysis almost or quite to the umbilicus, is made down to, and through, the sheath of the recti muscles. These are separated by the scalpel handle as shown in Fig. 5, and may be undercut on one or both sides to give ample exposure. In very stout individuals the semilunar transverse incision with convexity downward (Fig. 6) may be employed to advantage. The peritoneum is then incised, the intestines packed off and, along with the peritoneum and edges of the wound, protected by gauze pads. The bladder is lifted with Schoenberg's or Allis' forceps, inspected for peritoneal invasion by the growth, opened as shown in Fig. 7, and sponged out as thoroughly as possible. With the

patient in the Trendelenburg position, and the bladder pulled well forward, a second cut with scissors through all coats is made in the direction of the tumor (dotted line, Fig. 7). This cut is carried to within two centimeters of the tumor. Then with angulated scissors the growth is circumcised through all coats at a distance of two to three centimeters from its periphery (Fig. 8). Following the resection of the tumor-bearing area, the cut edges of the bladder-wall should be cauterized or receive applications of a strong solution of resorcin, 25 to 50 per cent. Frequently it will be necessary to resect a fourth or a third of the bladder. It will be recalled that a half or even two-thirds of the bladder has been successfully excised, and although at first much restricted in size, it is surprising to observe how soon the viscus will enlarge to satisfactory proportions. Should the ureteral orifice be involved by the growth, the terminal end of the ureter is exposed by making traction on the circumcised tumor-bearing area, ligated, delivered through a small peritoneal incision close to the bladder, and reimplanted through a stab wound in healthy vesical tissue. This is accomplished by longitudinal bisection of the ureter for a distance of one and a half centimeters, or by oblique section of its end, suturing the edges to the vesical mucosa (Fig. 9). The exposed extravesical part of the ureter is covered by a fold of peritoneum.

It is advisable, unless obliged to do so in order to remove all diseased tissue, that the resection should not approach nearer than one centimeter of the vesical orifice. In extensive resections of the floor of the bladder, there may result a small space which is difficult or impractical of closure. This need occasion no great concern as it will probably heal satisfactorily by granulation. As a rule, however, the vesical incisions, both oblique and longitudinal, are easily and securely closed by the running mattress or Connell suture. The usual practice has been to include all coats in the employment of this suture. The writer has modified the introduction of this suture by exclusion of the mucosa in a few cases with entire satisfaction (Fig. 10). A supplementary running suture of linen, including the peritoneum, parallel to the deep suture, is introduced and reinforces the latter.

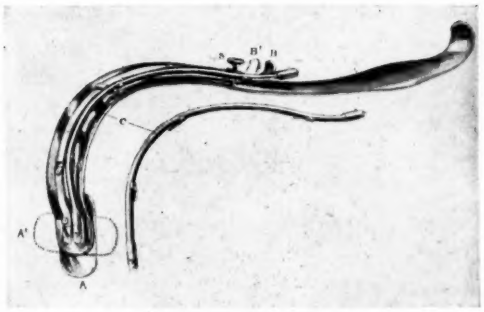

Fig. 14. Author's bladder retractor. The instrument is capable of introduction through a small vesical incision, after which the cross-blade is readily swung into position. The electric lamp is powerful and durable and the carrier is easily detached for purposes of sterilization.

Unless the bladder presents evidence of marked infection, or the ureter has been transplanted, it is unnecessary to drain either the peritoneal cavity or the bladder. If a small area in the base of the bladder has been allowed to remain unsutured, or the bladder is in a condition of extensive cystitis, a counter-incision should be made and the bladder drained extraperitoneally through the space of Retzius. Usually patients are able to void small quantities of urine frequently and will be more comfortable without than with a catheter. If vesical irritability or tenesmus persists, irrigations with small quantities of warm boric acid solution will prove serviceable.

So soon as expedient, vesical lavage with a 2 to 10 per cent solution of resorcin, as described above, should be practiced on the assumption that it possesses prophylactic value against recurrences.

The *technique* of extraperitoneal partial cystectomy varies with the location of the tumor. For tumors situated on the anterior wall of the bladder, the procedure recommended by Hagner[1], consisting essentially in outlining the boundaries of the growth by the introduction, suprapubically, of sutures defined by cystoscopy, followed by wide excision of the tumor, possesses merit. Un-

[1] Surg., Gynec. & Obst., 1911, xiii, 326.

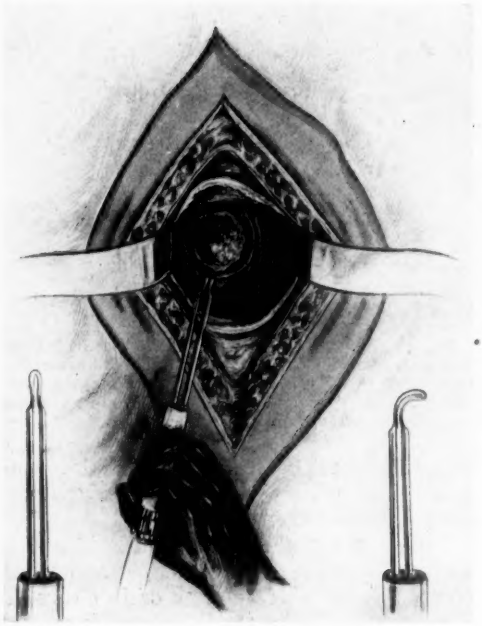

Fig. 15. Excision of tumor with electro-cautery knife. The knife with curved blade has been useful in freeing the tumor from its substratum.

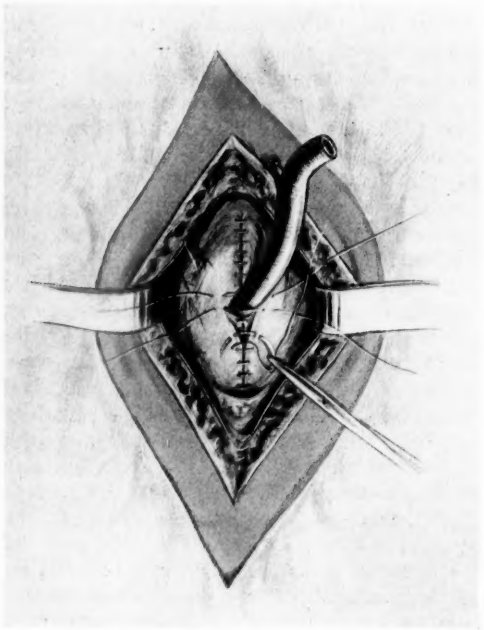

Fig. 16. Showing placement of sutures for closure of the bladder, especially for water-tight security of drainage tube. Observe two-way tube, useful for continuous irrigation, or, by clamping inlet attachment, serviceable for suction drainage.

fortunately, however, few tumors frequent this portion of the bladder.

Growths situated on the sides of the bladder-wall particularly, but also those occupying the fundus and posterior wall are often most satisfactorily operated upon by the technique so lucidly and graphically described by Squier.[1] The operation is not strictly an extraperitoneal one, and should be regarded as a combination of the extraperitoneal and intraperitoneal routes. The steps in the procedure are: (a) an incision down to and through the sheath of the recti muscles, extending from a point a little above and to the left of the umbilicus to the symphysis pubis; the peritoneum is opened, the patient placed in the Trendelenburg position and the intestines displaced and protected by gauze in the upper abdomen; (b) the peritoneum and urachus are grasped and the obliterated hypogastric arteries exposed; (c) the vasa deferentia are located coursing along the wall of the pelvis inside the hypogastrics; (d) the ureters are exposed above the pelvic fascia as they are about to enter the bladder, by following down the vasa deferentia; (e) the peritoneum is stripped from the bladder posteriorly and laterally, and the flap turned up completely protecting the peritoneal cavity; (f) the bladder is forcibly pulled forward and incised vertically in the mid-line on its posterior surface; (g) counter-incisions are then made, differing in no essential from the procedure described under transperitoneal resection; (h) the peritoneum is closed and the bladder sutured as previously detailed; (i) the bladder is drained by catheter inserted through and sutured to a stab wound anteriorly; (j) the abdominal wound is closed about a wick drain introduced to the site of ureteral anastamosis.

Total cystectomy. This is a desperate surgical procedure, rendered doubly grave

[1] Surg., Gynec. & Obst., 1914, xix, 91.

by the fact that as a rule operators, in the past, have attempted to perform at one time a two-stage operation. Although a high operative mortality is ever to be expected, undoubtedly the present figures will be much reduced so soon as surgeons appreciate the fact that the primary operations must be restricted solely to a satisfactory derivation of the urine, leaving the removal of the bladder for a subsequent operation. As has been inferred, the disposal of the urine becomes the chief concern in total cystectomy. Two methods are feasible: first, transplantation of the ureters and second, bilateral nephrostomy. The ureters have been transplanted variously to the rectum, colon, appendix, urethra, vagina, loins, and suprapubically, and consequently to no site with uniform satisfaction. Maydl's operation with transplantation of the trigonum is invariably impractical in tumors of the bladder. Few patients have survived ascending infection of the kidneys sufficiently long after implantation of the ureters into the intestinal tract to warrant the procedure. Implantation into the urethra has not proved successful. A few successes have been reported from ureterostomies suprapubically and many have been transplanted to the loins, but as a rule the ureteral openings become strictured and renal infection supervenes. Undoubtedly vaginal implantation is the logical and best procedure in the female, but only a small minority of vesical tumors occur in women.

Realizing the poor results that obtained following ureterostomy and particularly the association of ureterostomy with total cystectomy at a single operation, Watson, in 1905, recommended preliminary bilateral nephrostomies, supplemented by total cystectomy at a later operation. In a personal communication, recently received, Watson reiterates his proposition of 1905. He states: "The chief causes for the mortality attendant hitherto upon the operation of total cystectomy in cases of vesical tumor are two—shock and renal infection. Shock is largely due to two things: first, the operations have been done under manifestly improper conditions, namely, when the patients are already greatly exhausted by the long continuance

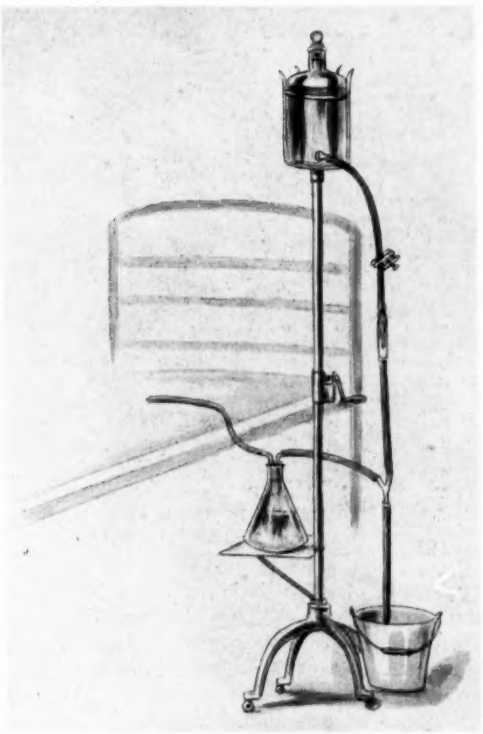

Fig. 17. Hydrostatic suction apparatus for aspiration and drainage of bladder.

of a malignant disease and in most of them when metastases are present; second, the operation of removing the bladder has been greatly prolonged by the fact that the ureters are implanted at the same time that the operation for removing the bladder is done.

"The second fatal element in these cases thus operated is due to the fact that renal infection supervenes because the ureters are implanted in the intestine or the vagina and — though in less degree injurious — to the body surface.

"In view of these things, I proposed to lessen the operative mortality first by applying the operation of total cystectomy only to such patients as retained at least a fairly good power of resistance and who were not greatly reduced by the cachexia of malignant disease and did not in all probability have any metastases, and second by doing away,

Fig. 18. Showing correct position of bladder in suprapubic cystostomy. Note that the cut edges of the bladder have been sutured to the skin.

by means of a preliminary operation, with the time-consuming procedure of diverting the urine into a new channel. Next, in view of the great fatality from renal infection due to ureteral implantation, I proposed that this procedure be abandoned and that there be substituted in its place as a preliminary step to removing the bladder, bilateral nephrostomy, and that at whatever time after the patient should have recovered from that operation the total cystectomy be done. I suggested likewise that the bilateral nephrostomy and tying-off of the ureters near the renal pelvis could be done as a palliative operation in cases of hopeless vesical tumor and very painful vesical tenesmus in vesical tuberculosis."

Impressed with this doctrine and realizing the lesser liability of kidney infection in nephrostomy as compared with ureterostomy, hence the opportunity to effect a permanent cure, and at the same time mindful of the necessity of a comfortable and efficient renal drainage apparatus, I determined, about one and a half years ago, to execute Watson's suggestion in exact detail on a patient, No. 15 in table "Summary of Results," presenting multiple recurrent inflamed polypi occupying the vesical base and neck and the prostatic urethra. The left kidney was first nephrostomized to a lumbar incision after ligation of the ureter with chromic catgut close to the renal pelvis. (This ligature subsequently was prematurely absorbed necessitating religation with silk.) Five and a half weeks later the right kidney was nephrostomized and the ureter ligated with silk. The patient convalesced satisfactorily and was equipped with the drainage apparatus shown in Fig. 11, which fulfilled the requirements of dryness, comfort, and lightness extremely satisfactorily. Eight and a half months later total cystectomy, employing the combined transperitoneal and extraperitoneal methods, was performed. The patient made a remarkable recovery, left the hospital with his drainage apparatus intact and engaged in light work. Four and a half months later, owing to deep urethral irritation, he was re-admitted and subjected to a radical prostato-urethrectomy. From this operation he also made a notable recovery, and throughout this time up to the present his renal drainage and function have been almost perfect. In view of the success which has attended the operative procedures in this case, I feel that it should be recorded, since Watson writes me respecting his proposition for cystectomy, saying: "I know of no case in which it has been literally followed out except your own."

Provided the patient has not passed into an inoperable condition owing to extension of his growth or organic state, the operation of total cystectomy is indicated in the following vesical conditions: (1) single or multiple growths covering a wide extent of the bladder-wall (not papillomata); (2) growths involving both ureteral orifices, the entire trigonum, the vesical orifice or the prostatic urethra; and (3) intractable cystitis.

Total cystectomy may be performed either *extraperitoneally* or *intraperitoneally* or both. It may be limited to a *simple* suprapubic excision of the viscus or *combined* with a perineal operation, comprising then a *perineo-suprapubic cystectomy* or a *cysto-prostato-urethrectomy.*

The *technique* of total cystectomy, so far as the preliminary care of the bladder is concerned, differs in no respect from partial

cystectomy. If the growth has involved the peritoneum, an intraperitoneal or transperitoneal operation must be done, the steps of which have been previously detailed. Otherwise the peritoneum is reflected from the fundus and posterior aspect of the bladder, keeping close to the musculature of the viscus or as the base of the organ is approached, the line of cleavage may lead the dissection between the deep layers of the divergent pelvic fasciæ and away from the vesical neck. The vasa deferentia are isolated and severed between double ligatures, the seminal vesicles exposed and the ureters cut between ligatures (Fig. 12). Exerting considerable traction anteriorly and downward, the bladder is pulled over the symphysis, and its neck cut across with long curved scissors or the electrocautery. Hæmorrhage may be controlled only by packing.

In those cases requiring removal of the prostate, prostatic urethra, and internal vesical sphincter, as in case No. 15, herein reported, it is advisable, as a preliminary step, to free the prostate and vesical neck and sever the membraneous urethra through a perineal incision, similar to that in the operation of radical prostatectomy for carcinoma. This procedure greatly facilitates the suprapubic removal of the bladder, whether by the extraperitoneal or combined intraperitoneal route. The exigencies of the particular case may demand that the primary cystectomy be supplemented at a later time by perineal prostato-urethrectomy.

Total cystectomy in the female may be done by Pawlik's method. The ureters are exposed per vaginam, ligated close to the bladder-wall, severed, and implanted into the vaginal wall. A few weeks later the bladder is separated from the peritoneum through a suprapubic incision, a second incision is made through the vaginal wall above the urethra and the bladder delivered into the vagina and removed by severance of the urethra. The latter is anastamosed to the vaginal wall and at a subsequent operation the vaginal orifice is closed, forming thereby a suitable urinary reservoir or artificial bladder, conveniently drained by the deflected urethra.

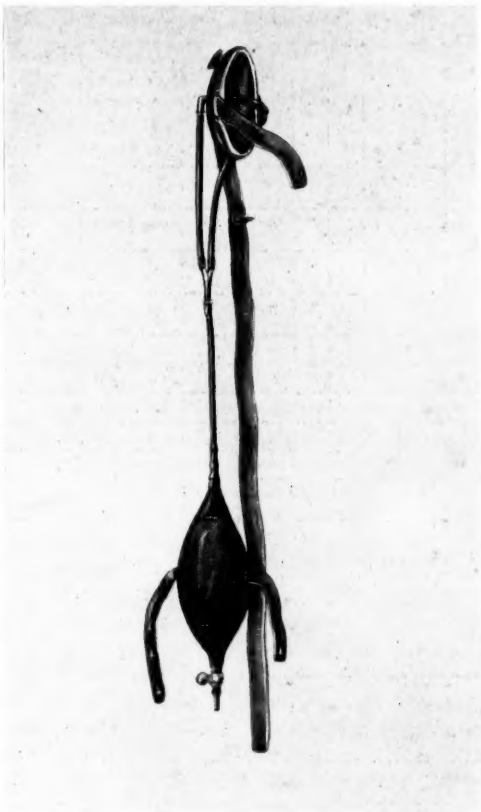

Fig. 19. Suprapubic bladder drainage apparatus. The cup is provided with two outlet tubes for conducting the urine to the urinal. A fenestrated rubber tube attached to the inside of the cup passes into the bladder. A trap door permits of inspection of the interior of the cup when the apparatus is in position.

The *palliative operative treatment* of bladder tumors comprises the well-known operations: (1) suprapubic extraperitoneal cystotomy with excision, cauterization or high-frequency sparking or radium applications to the tumor mass, (2) simple suprapubic cystostomy, and (3) exclusion of the bladder.

Suprapubic cystotomy. The bladder is filled with boric acid solution. The patient is placed in the Trendelenburg position. A vertical incision three inches in length, is made extending upward from the symphysis pubis down to and through the sheath of the

SUMMARY OF RESULTS OF TREATMENT OF BLADDER TUMORS

No.	Initials	Age	Sex	Character of Tumor	Duration of Symptoms in Months	Previously Operated	Operable Radically	Operable by High-frequency Electro-Coagulation	Inoperable Except as Palliative Measure	Time from Operation to Recurrence or Present in Months	Time from Operation to Death in Months	Condition When Last Heard from
1	J. S.	68	M.	Carcinoma	72	No	No		Suprapubic cystostomy		1	Dead
2	C. T.	73	M.	Carcinoma	24	No	No		Suprapubic cystostomy		1	Dead
3	W. H.	38	M.	Sarcoma	12	No	No		Suprapubic cystostomy		2	Dead
4	I. G. A.	61	M.	Papillary carcinoma	18	No		Yes		12		O. K.
5	J. B. H.	54	M.	Carcinoma	48	Yes	No		High-frequency	3	12	Dead
6	M. T. D.	53	F.	Carcinoma	48	Yes	No		High-frequency		16	Dead
7	G. E. S.	44	M.	Carcinoma	12	Yes	No		High-frequency		8	Dead
8	C. G.	45	M.	Papilloma	0	No		Yes		48		O. K.
9	F. E. B.	60	M.	Papillomata	32	Yes		Yes		27		O. K.
10	H. G. S.	54	M.	Papillary carcinoma	24	No	Yes, suprapubic and cautery	Yes		16		O. K.
11	E. R.	71	M.	Papilloma	48	No		Yes		40		O. K.
12	S. H.	77	F.	Carcinoma	2	No	No		Yes		1½	Dead
13	C. N. C.	52	M.	Carcinoma	96	Yes	No		Suprapubic cystostomy		3	Dead
14	G. D. W.	64	M.	Carcinoma	9	No	No		Cystostomy, electro-cautery, radium.	9		O. K.
15	W. K.	38	M.	Multiple polypi	24	Yes	Yes; bilateral nephrostomy and total cystectomy prostato-urethrectomy, radium			7		O. K.
16	W. P.	59	M.	Papilloma?	?	No	Yes, suprapubic and cautery				5	Dead
17	M. A.	62	M.	Carcinoma	24	No	No		Suprapubic cystostomy		6	Dead
18	J. S.	48	M.	Carcinoma	3	No	Yes; refused				6	Dead
19	J. L. C.	29	M.	Cysts	1	No		Yes		42		O. K.
20	R. E. H.	70	M.	Papillomata	120	No	Yes			9		O. K.
21	S. Y. H.	53	M.	Papilloma	72	No		Yes		18		O. K.
22	S. J. F.	48	M.	Papilloma	36	No		Yes		1		O. K.

recti muscles. These are separated by blunt dissection and the bladder-wall is exposed. Near the upper angle of the wound the peritoneal reflection must be recognized in the fat and carefully retracted up out of the way. The bladder-wall is securely caught on either side of the median line by sharp hooks and the viscus is opened (Fig. 13). Retractors are now introduced into the cavity of the bladder in an effort to obtain a satisfactory exposure. The main distress of the surgeon has arisen in the past from improper or poor retraction and exposure in this operation. In Fig. 14 is illustrated a retractor which has proved most useful in the author's experience. With two such instruments the exposure of the base of the bladder, including the ureteral orifices, is almost perfect.

Inasmuch as this operation is undertaken with little or no idea of cure, but simply to prolong life by retarding the growth of the carcinoma by removing as much as may be possible through excision with or without cauterization, high-frequency electro-coagula-

tion, or radium applications, incidentally to remove blood-clots and afford better drainage, the operative procedure is expedited to the fullest degree. The electro-cautery, equipped with heavy platinum cautery knives mounted in mineral handles (Fig. 15), capable of being boiled, is undoubtedly the most serviceable instrument for this purpose. The bladder is closed water-tight about a drainage tube by a continuous suture of catgut, avoiding the mucosa. A secondary or reënforcing running suture of the Lembert type completes the closure of the bladder (Fig. 16). The specially constructed two-way drainage tube shown in the latter figure has proved very satisfactory, particularly when continuous irrigation is used. A clamp placed on the small inlet attachment of the drain permits of its use in connection with hydrostatic suction apparatus (Fig. 17).[1] The drainage tube should not project too far into the bladder and should be placed well up toward the fundus.

Suprapubic cystostomy. Not infrequently in these incurable cases, any operation, other than simple suprapubic cystostomy, is inadvisable. The operation becomes necessary for the removal of clots, to stop hæmorrhage, to relieve pain, and to permit of urinary drainage. The technique of the procedure differs little from that of cystotomy. The incision through the bladder should be made well up toward the fundus and the vesical wall should be sutured to the skin (Fig. 18). Obviously this means a permanent suprapubic fistula, necessitating some such apparatus as shown in Fig. 19, after the patient is permitted to be out of bed. While the patient is bed-ridden, the Pool aspirator will prove most serviceable.

Exclusion of the bladder. Reference has already been made to this procedure in the discussion of the operation of "Total Cystectomy." The determination as to the best disposal of the ureters or derivation of the urine in cases of incurable malignant tumors of the bladder, is one of the foremost problems of urological surgery today. Until recently the consensus of surgical thought has favored the belief that the danger of immediate mortality and ascending renal infection from the transplanted ureters is greater than any amelioration of symptoms through operative procedures, in view of the rapidly progressive fatal nature of the disease. Undoubtedly, the given case must be decided on its own merits, and a decision reached between lumbar, rectal, or vaginal ureteral implantation, bilateral nephrostomy, and simple suprapubic cystostomy. It is probable, in view of lesser likelihood of renal infection and improvements in the construction of kidney drainage apparatus, that the future will see more nephrostomies performed in accordance with the suggestions of Watson.

Irrespective of the character of the vesical tumor, whether benign or malignant, or the method of treatment, whether by high-frequency destruction, the electro-cautery, or radical resection of the bladder, the patient should be routinely and periodically cystoscoped for an indefinite time after the removal of his vesical growth. My rule is to advise the patient to report for reëxamination cystoscopically, every three months the first year, twice the second year, and again at the conclusion of the third year, in order that recurrences may be discovered in their incipiency. Recurrences may appear even after the three year time limit, so that the importance of supplementary cystoscopic examinations cannot be too strongly emphasized.

An analysis of the 22 cases[2] tabulated in this paper shows that 50 per cent of the patients are dead. Of these eleven cases, nine were pronounced inoperable when first seen, except as a palliative measure; of the remaining two, one was cauterized suprapubically instead of being subjected to a partial cystectomy, the other refused operation. It is notable that the patients with carcinoma (excepting the papillary form) have invariably died. Of those who died, only one patient lived longer than a year after his treatment or cystoscopy. Six patients had been previously operated upon, five of whom at the time of

[1] The most ingenious and effective suction-drainage apparatus is that devised by Pool, comprising a double metallic tube, the outer one of which is fenestrated, the inner one provided with a trap to prevent vacuum creation and back-flow; this drain is connected with and operated by an ordinary suction pump attached to a convenient faucet.

[2] Since the presentation of this paper, the writer has had the opportunity to treat, by high-frequency electro-coagulation, four additional cases of papilloma of the bladder. One of these was cured by two applications of the Oudin current, the other three are still under treatment, although markedly improved.

their first cystoscopy had pronounced carcinomatous recurrence. Each case of papilloma or cyst — with one exception in which probably a false diagnosis was made — is living and well. Two cases exhibited recurrences after treatment by the high-frequency current. In one of these, the papilloma reappeared three times, but the growth was readily destroyed by repetitions of the electrical spark. Thus the importance of the differentiation between papillomata and sessile carcinomata respecting the adoption of the proper form of treatment is a matter of first magnitude. In the event of operable carcinoma anything short of radical operation is folly. If the tumor be a papilloma, high-frequency electrocoagulation is by all odds the form of treatment productive of the best results. Even though the papilloma may recur — an event far less frequent after the high-frequency spark than the aseptic scalpel — the patient may be subjected to a repetition of the same form of treatment, while there is a limit to the number of major surgical operations.

FULGURATION IN THE TREATMENT OF BLADDER TUMORS

By J. T. GERAGHTY, M.D., F.A.C.S., Baltimore
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SOME confusion exists concerning the types of bladder tumors suitable for fulguration. There is a more or less general agreement that the hard, lobular, infiltrating carcinomata are more harmed than benefited by fulguration, but that this treatment, on the other hand, for typical benign papillomata yields results immeasurably superior to that obtained by any other procedure. Uncertainty exists regarding the possibilities of fulguration for malignant papillomata and for the diffuse papillary and sessile tumors which are always carcinomatous. Beer makes the positive statement that the high-frequency treatments are only applicable to the benign papillomata, but numerous surgeons have now revealed the apparent cure of tumors pronounced malignant by the pathologists. Others question the ability of the pathologists to decide between the benign and malignant nature of the papilloma and consider that the nature of the growth is to be decided, not upon its histological characteristics, but upon its manner of response to fulguration.

In sixty-eight cases of bladder tumor seen in the past four years in the Urological Clinic of the Johns Hopkins Hospital, fulguration has been employed in forty-seven, and in thirty-six of the forty-seven cases the tumors were papillomata. In ten cases the tumors were either hard, lobular, infiltrating carcinomata, or diffuse papillary carcinomata associated with more or less extensive infiltration of the bladder-wall. Of the thirty-six papillomata a histological study of the tumor was made in twenty-five cases. Of these twenty-five, eight were typical benign papillomata and seventeen malignant papillomata of varying degrees of malignancy histologically. The Oudin or unipolar current was employed in practically all the cases because it seemed just as efficient and destructive as the bipolar.

RESULTS IN THE BENIGN PAPILLOMATA

In the eight cases with benign papillomata, histologically in only one case was there more than one tumor present, and this patient had one large tumor near the left ureteral orifice with numerous small implantations around the vesical orifice. In seven of the cases the tumor disappeared in from two to five treatments, the tumors varying in size from a half centimeter to several centimeters. In one case with a large papilloma the patient did not return for treatment after the second application. Up to the present time there have been no recurrences observed in this series, the patients being well from six months to three years.

RESULTS IN PAPILLOMATA NOT EXAMINED HISTOLOGICALLY

In this series there were eleven cases and all had single tumors with the exception of

one patient, who had seventeen small papillomata scattered over various portions of the bladder. He had had a suprapubic excision one year previously.. The tumors were all small and were destroyed in four applications. In seven of these cases the tumors were cystoscopically of the benign type; they were definitely pedunculated and had very fine delicate papillæ. In all of these eleven cases the tumor disappeared entirely, and in none, up to the present time, has a recurrence been observed in the bladder, although one case has since died of carcinomatous metastases. This case is of particular interest:

The patient, age 48, had a history of hæmaturia of several years' duration. He consulted a surgeon who diagnosed the condition bladder tumor and advised suprapubic drainage for relief of urinary symptoms because it was considered that the tumor was inoperable. At operation a large papillary tumor was found on the left lateral wall of the bladder, and because of its apparent hopelessness nothing was done except to establish a suprapubic fistula. He was seen about four months after this operation, and it was decided to try the effects of fulguration, although very little hope of a successful result was entertained. The tumor was vigorously fulgurated through the suprapubic fistula by means of the Young fulgurating sound, and later direct fulguration through the cystoscope was carried out. At the end of two months no tumor could be seen in the small contracted bladder, and it was decided to close the suprapubic fistula, a procedure which was carried out. At operation the most careful search of the bladder failed to show any evidence of tumor, and small pieces of bladder-wall snipped off from various portions and examined microscopically failed to show the slightest indication of any tumor. For the next nine months the patient was apparently entirely comfortable except for frequent urination from his contracted bladder. Examination then showed, however, evidences of carcinoma of the prostate, which was the result either of a metastases or of implantation from the old bladder tumor. Later on he developed spinal metastases and died eighteen months after the bladder had been cured, and even though there developed no recurrence locally. Although no tissue was obtained in this case for microscopic examination the end-result proves very conclusively that the tumor was malignant.

RESULTS IN MALIGNANT PAPILLOMATA

In seven of the sixteen cases in which a histological diagnosis of malignant papilloma was made, the tumors were multiple. In one of these cases, more than a hundred small tumors, varying from 1 mm. to 0.5 cm., were scattered in all portions of the bladder. In this case five large papillary tumors had been removed suprapubically some months previously and these tumors represented recurrences. In another case the bladder mucous membrane was literally completely covered with papillomatous tumors so that one could see but small portions of mucous membrane even when the bladder was opened. Five of these sixteen tumors had had previous operative procedures of varying kinds — either resection, excision with clamp and cautery, or cauterization with the actual cautery. In ten cases the tumors were entirely destroyed. One case is still under treatment. This is a patient, aged 77, with a malignant papilloma several centimeters in diameter near the right ureteral orifice. Fulguration destroyed about two-thirds of the tumor, but as the tumor seemed very resistant it was decided to substitute radium, which is now being applied. One case died while under treatment, but the tumor in this case had almost disappeared. In two cases the tumors resisted absolutely, although in each instance the tumor was small and was frequently and vigorously burned. In both of these cases examination of the tissue obtained showed tumors very malignant in character with definite infiltration of the connective-tissue axis. In one of these cases the tumor seemed rather to be stimulated and grew under fulguration to several times its original size. A successful resection was subsequently performed and the patient has now been well over two years. The other patient developed multiple tumors and died of a cardiac condition following a senile dysentery. In one case, owing to the feebleness of the patient and a bad myocarditis, treatment was desisted in after a sufficient number of the tumors had been removed from around the vesical orifice to permit freedom of urination. This patient had a markedly contracted bladder and had had three previous suprapubic excisions of multiple papillomata. He died a few months later of the cardiac condition. The tumors in this case were very responsive, and if treatment could have been continued it would have been

possible to have removed all of the tumors. In one case in which the bladder mucosa was completely covered with papillomata of varying sizes it was decided to open the bladder and apply fulguration. This was carried out, the tumors being sparked with a strong current for a period of forty-five minutes. About ten days later the patient was again given ether, and after the bladder-walls had been retracted it was found that with the exception of a few small papillomata the tumors had entirely disappeared. These remaining tumors were then vigorously fulgurated. Subsequent examination of the bladder a few weeks later showed no sign of tumor. About six months after leaving the hospital the patient was again seen, and examination at this time showed about a half dozen small papillomata in various portions of the bladder. He refused further treatment. Up to the present time there has been a recurrence in four cases in which the tumors had been previously entirely removed. Two patients whose tumors disappeared under fulguration have since died with carcinomatous metastases, one one year and the other fourteen months after the tumor had been destroyed.

The history of these two cases is as follows:

CASE 1. Male, age 50. History of hæmaturia for three years previous to his examination. Cystoscopy showed a small papilloma on the right lateral wall and a group of seven papillomata covering a large portion of the left lateral wall and extending so as partially to obscure the left ureteral orifice. The tumor on the right lateral wall was destroyed by two applications. The tumors on the left lateral wall were very resistant and at least twenty-five treatments, vigorously and frequently applied, were necessary before the last vestige of tumor disappeared. A period of almost six months was occupied in the removal of these tumors. About two months after the last vestige of tumor had been destroyed a small recurrence about the size of a pin-head was discovered back of the trigone. This was readily removed. Some weeks later another similar recurrence was discovered. Although the patient was seen at frequent intervals during the next six months there was no evidence of recurrence on careful cystoscopic examination. At the end of this time, however, another tiny pin-head-size recurrence was noted, which was also easily and readily cured. The patient remained well until four months later, when he developed spinal metastases and also had a metastasis to the clavicle. He died about fourteen months after the original tumors had been removed.

CASE 2. Male, age 45. History of hæmaturia for four years. Cystoscopic examination showed a large papilloma apparently almost filling the bladder and encroaching upon the vesical orifice so as to make urination extremely difficult and Painful. On account of the position of the tumor and the severe urinary symptoms of the patient it was decided to excise the tumor suprapubically. On opening the bladder an enormous papilloma with a narrow pedicle and no infiltration of the base was discovered, and this was removed with the paquelin cautery and the base thoroughly cauterized. About six months after leaving the hospital several small papillary tumors were found in the region of the right ureteral orifice and were readily destroyed by fulguration. Examination nine months after operation showed a very marked cancerous condition of the prostate, although at this time the bladder was entirely free of tumor. The patient rapidly developed spinal metastases and died of exhaustion and cachexia about eighteen months after the operation.

RESULTS IN HARD LOBULAR CARCINOMATA AND PAPILLARY CARCINOMATA

In this series there were eleven cases. Of these three were of the hard, lobular, infiltrating type, two were hopelessly inoperable, and the other had had an extensive resection, and an attempt was made to treat the recurrence. In none of these cases was the slightest benefit obtained from the treatment, and, furthermore, it was extremely painful. In eight cases the tumors were papillary carcinomata with varying degress of infiltration of the bladder-wall. Three of these had been previously operated upon. In none of these was it possible to eradicate the tumor or to effect more than partial symptomatic relief. In several cases in which the tumor crowded around the vesical orifice, interfering with urination, it was possible to destroy sufficient of the tumor to render urination free.

DIAGNOSIS

In the vast majority of cases in our experience it has been possible to differentiate between the papillary carcinomata and the papillomata. The cystoscopic examination, in most instances, combined with the histological picture and the various clinical data obtainable, such as infiltration of the bladder-wall, which can be detected so frequently

when the tumor is on the posterior or posterolateral wall, gives the necessary information. Again, valuable information may be obtained from X-ray examination with the bladder filled with collargol or other shadow-casting substances. The presence of infiltration of the bladder-wall, the extent of this infiltration, or sometimes the pedunculated character of the tumor, will be astonishingly revealed. On cystoscopic examination, a nodular condition of the mucous membrane around the tumor mass or the presence of œdema or a bullous condition of the mucous membrane is almost invariably an indication of infiltration. Where the combination of diagnostic methods fails to make the diagnosis, the results of fulguration will help to settle it. Some difficulty arises in differentiating between multiple papillomata fused on the surface and the diffuse papillary carcinoma, but in our experience this difficulty has seldom occurred. More difficulty will be experienced in differentiating between papilloma and small papillary carcinomata which may resemble each other cystoscopically.

PATHOLOGY OF PAPILLOMATA

The surface character of these tumors varies considerably. More commonly innumerable small villous or papillary projections give the surface a shaggy appearance. In other types the villi are soft, more compact, and resemble, when seen in the bladder, the surface appearance of a raspberry. They are extremely friable, and when a portion is seized with a clamp, it readily tears asunder. The central portion of the tumor is usually firmer because it contains more of the connective-tissue stroma. The tumor mass overhangs the pedicle, and, mushroom-like, conceals its point of attachment to the bladder-wall. The pedicle is usually short, although occasionally a pedicle so long that it allows considerable excursion of the tumor mass in the bladder cavity is observed. The consistency of the pedicle varies somewhat with the amount of connective tissue which it contains, but it is always firmer than the periphery of the tumor. In most instances it is impossible from the gross appearance to decide the character of the growth, so closely in general appearance do the benign and malignant papillomata resemble each other. The pedicle in the malignant papilloma may be freely movable over the underlying mucosa and there may be nothing in the appearance to reveal its malignant character. In the vast majority of cases the differentiation between the benign and malignant papilloma can be made only by the most careful microscopic study and it sometimes necessitates the examination of sections from various portions of the tumor. Indeed, occasionally, even careful microscopic study fails to reveal the true nature of the growth. In many malignant papilloma the cancerous nature is at once apparent both in general architecture as well as in the epithelial infiltration of the connective-tissue framework, but at other times the histological picture may resemble on superficial examination a benign papilloma. In the benign papilloma the connective-tissue axis is lined by an epithelium which has a palisade arrangement at the base, above this many layers of oval, long-tailed cells, which are uniform in size, shape, and staining characteristics. Toward the surface the cells become flattened and the most superficial are similar to the epithelium of the normal bladder mucosa. In the malignant papilloma the arrangement of the epithelium is changed and instead of being in regular uniform layers it is disordered. The individual cells are irregular in size and shape and take the stain with varying degrees of intensity. These variations from normal are even more evident in the nuclei. At times, owing to the lawless growth of the epithelium, the papillæ fuse so that the regular papillary arrangement is destroyed. Not infrequently in the same field papillæ can be seen undergoing various degrees of alteration. In one portion the epithelium may have all the characteristics of the benign papillæ, but close by may be papillæ in which epithelial changes characteristic of the malignant papilloma are very evident. Sometimes the malignant picture is best seen in sections from the surface, while sections from the middle of the tumor and base may be considered typically benign. At other times sections from the middle of the tumor or

portions near the base may show the most marked evidence of malignancy. The old view that the nature of the tumor is to be decided upon especially after examination of its base is distinctly erroneous. It has now been repeatedly proved that the base of a papilloma may show no signs of infiltration and still the tumor be distinctly malignant in its body and periphery. When infiltration of the base does occur, the tumor ceases to be a true papilloma and becomes rapidly sessile — a distinct papillary carcinoma. The diagnosis of a malignant papilloma is at times very simple, as the histological changes are characteristic of typical carcinoma, while at other times the histological picture as a whole resembles so closely the benign tumor that only a careful study, by an experienced pathologist, of numerous sections will reveal its true nature. Probably in no other tumor has so many mistakes been made by the best pathologists. It should be emphasized that in papillomata evidence of epithelial infiltration of the connective-tissue stalks is not necessary for the diagnosis of malignancy, and that every papillomata that shows the slightest change either in arrangement, shape, size, or staining properties of the epithelium should be looked upon as malignant. It must be admitted, however, that there is no histological picture which can be considered as always absolutely characteristic of either benignancy or malignancy.

SUMMARY AND CONCLUSIONS

In only tumors which were papillomata has fulguration succeeded in destroying them, and it has been possible to destroy not only the benign but the malignant papillomata. The response to treatment, however, in the benign as compared with the malignant is of considerable interest. Where the tumors are cystoscopically and histologically benign the rapidity of disappearance is frequently astonishing. When, however, the papillomata are malignant the response to fulguration may be extremely slow and lead almost to discouragement. Where the histological picture is distinctly malignant one can almost positively predict that the response to fulguration will be extremely slow. Sometimes small malignant papilloma will require many times the amount of treatment which would have been necessary to have destroyed a benign papilloma of the same size. In one case with multiple malignant papilloma covering the left lateral wall of the bladder and the tumors so fused at their surfaces that it seemed like one large tumor mass, seventy-five treatments, extending over a period of nine months, were necessary to entirely eradicate the neoplasms. The result in this case might be considered brilliant, because no radical operation could have given as complete a result. In the papillary carcinoma or sessile tumors, where infiltration of the base is always present, the chances of eradication of the tumor by this method of treatment are practically nil, although considerable symptomatic relief may at times be obtained.

From the standpoint of ultimate prognosis it is important to have a knowledge of the nature of the growth removed, because in three of our cases in which malignant papilloma had been successfully removed, death occurred later from metastases, although the bladder remained free of tumor. Furthermore, recurrences have been encountered only in cases in which malignant papilloma had been removed. Up to the present time recurrences have been observed in four cases.

It can now be positively stated that fulguration should be the treatment selected for all papillomata, benign or malignant, in which infiltration of the bladder-wall has not occurred, and that it yields results incomparably superior to the most radical operative procedures.

SURGERY OF THE URINARY BLADDER

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THE surgery of the bladder for new-growths is still in the period of development. This is demonstrated by the fact that there is no uniform method of interference, whether it be with radium, the X-ray, with the intravesical procedure with one of the many operative cystoscopes, or with the aid of the high-frequency current, or even whether it be with the scalpel. In this review I shall refer only briefly to all methods and attempt to outline what has been done up to the present time with the open-cutting operation.

As a matter of historical interest, Warner, in 1747, through a lateral perineal incision operated successfully upon a tumor of the bladder. Previous to this time little had been done, and that only in a haphazard sort of way. Civiale recognized two kinds of tumors, carcinoma and fungus. He believed the latter more common, and noted that it occasionally became transformed into a cancerous growth. Civiale did not use the lateral perineal stone incision, which was practically the universal route up to that time, not only for diagnostic purposes, but for removal as well. He used an intravesical method employing an instrument like a lithotrite, which would grip the growth, and crush and tear and remove in the best possible way. To say the least it was rather crude, but from what I could infer his results were as satisfactory, if not more so, than those obtained through a perineal incision. Hutchinson in 1857 reports median perineal incision and removal of growths from the bladder. Thompson used specially constructed forceps, used through the urethra or even through the perineum. Simon as early as 1875 described a urethral specula for use in women, by which he removed growths from the bladder. Kocher and Volkman used the speculum of Simon in the male, but performed external urethrotomy as a preliminary step. Thompson, Guyon, Antal, Mickulicz, and many others advanced methods all pertaining to interference through the perineum. In 1874 Billroth operated for a bladder tumor successfully from above. It remained, I believe, to Trendelenburg to describe in detail the *Bechenhochlagerung*, and the easy access to the bladder with this position. As to the route, incision through the vagina — colpocystotomy — was carried out more than twenty-five years ago. Yet Tamin in 1912 again advanced this method of approach. I believe the credit for the suprapubic method of approach to bladder tumors is due to Guyon. He did not devise it but insisted that if was the correct method. Partial and total resection of the pubic arch was suggested by Helferich, symphysiotomy in connection with bladder operations by Ferria, the lateral route by Levin as late as 1896. Franz was the first, if I am not mistaken, to advise the total removal of the bladder. Bardenhauer in 1887 was the first to carry out the operation — however, unsuccessfully. The following year Pawlik made a successful total cystectomy. Watson, of Boston, in 1905 took the advanced stand and proposed that it should be performed in all instances of cancer in which it is proper to do a radical operation; that is, in those cases where it is believed that the growth is confined to the bladder. Rydygier in 1888 advocated the intraperitoneal or abdominal mode of attack. Harrington in 1893 again brought this operation forward; Watson in 1905 revived the question, and in 1908 Mayo gave his experiences with this method of interference. Although my remarks are restricted in this symposium to "Operative Interference of the Bladder," it is necessary to refer in as few words as possible to the pathology, as well as the diagnosis, for full understanding as well as an appreciation of my attitude on this subject. Even in this era of modern cystoscopy one resorts to inspection, percussion, and auscultation for information as

regards resistance, size, and anomalies such as irregular shape, glandular involvement, etc. Bimanual palpation, particularly under anæsthesia, not often resorted to, with one or two fingers in rectum, and in women in the vagina, with other hand on the abdomen, gives information as to the involvement; that is, infiltration of the entire bladder, or, if only localized, a fair idea as to location and size. Soft tumors, large or small with no infiltration, cannot be palpated. Dilatation for palpation through the urethra of women as described by Simon, in the male by Thompson and Volkmann, is at the present time out of use.

With the examination of the urine and of particles of tumor passed with the urine, or gained, as originally advised by Küster, with a spoonlike catheter, or with the rongeur, as advised by Young, or with any one of the operating cystoscopes, some information may be gained. Sounds or catheters are of no accurate diagnostic value. One instrument, the cystoscope, is absolutely essential and the most reliable instrument for purposes of diagnosis. It permits a thorough examination of the interior of the bladder, and allows in most instances the recognition of tumors, their number, size, and location. I do not wish to discuss the question whether or not it is within the power of the individual to differentiate the character of growths as seen through the cystoscope, but I know that the greater the experience of the cystoscopist, the greater the possibility of recognizing whether malignant or benignant as classified in the accepted manner of today. It is not incumbent on me to discuss the advantages or disadvantages or the use of different cystoscopes. Suffice to say that individual cases may often decide which instrument to use in order to overcome obstacles. A thorough diagnostician in this field cannot limit himself to one method of cystoscopy or to one kind of cystoscope.

In cases where it is impossible to apply this mode of cystoscopic examination, exploratory operations have been advised—needless to state, in cases of contracted, irritable bladders, or where hæmorrhage is of such severity as to prevent inspection. In taking up this subject I realize that it would not be complete unless I insist on the necessity of taking all factors into consideration. I wish to refer to the question of considering the activity of the kidneys as well as the functionating capacity of the cardiovascular system, and of establishing in every known way the exact status of each individual. Where so many operations are necessarily carried out on the aged, I believe it is imperative to take advantage of every possible help. I believe that a medical examination of scrutinizing character should be made, including blood-pressure tests, hæmoglobin examination, white and red cell count, urine examination of every character, and all the methods which are peculiar to this field of work, cryoscopy of the blood, and all known functionating tests of the kidneys, and that all this mass of evidence should be carefully considered before deciding upon any operative step. It is needless to state that the general condition of the patient, or any individual factor which often plays a part, must be most carefully considered before discussing the question of the character of the operation, whether resection or excision, etc.

The anæsthetic is a matter of equal importance. It is not possible to discuss this question correctly unless all factors concerned are taken into consideration. I wish to state that it is desirable to consider scopolamine, morphine, nitrous oxide-oxygen; intraspinal, subdural, local infiltration of various kinds, ether and chloroform anæsthesias, either singly or combined. The selection of the anæsthesia as well as the selection of the correct operative procedure has everything to do with the results, as regards freedom from recurrence, and even with the mortality, as shown by the great variation in the statistics at our command. In order to be guided correctly and not to be misled, it is the sound judgment of the surgeon rather than statistics, after taking all the foregoing into consideration, which will lead to the best results. *I earnestly believe and insist that every new-growth of the bladder must be considered a serious matter.* Although an occasional cure has resulted following spontaneous torsion of a pedicle, and a large num-

ber of so-called benign tumors have been operated upon successfully, either intravesically or from above, without further tumors occurring, or recurrences at the site of the removal, or metastasis appearing in the individuals, still severe hæmorrhage, no matter from what kind of growth, has often caused conditions of grave import. Also benign tumors have become malignant, and in other instances tumors of like character have been noted elsewhere in the bladder and regarded as implantations, or false recurrences, or malignant growths; and many cases of metastatic as well as true recurrences have been the cause of death; and also transplantation following the apparent removal, either by resection or excision, of malignant, and supposed benign, growths have been recorded. I wish to refer to the article by Schmidt on tumors of the bladder, which appeared in the *Transactions* (1907) *of the American Association of Genito-Urinary Surgeons*, which pertains to this topic.

I naturally cannot go as deeply into the subject of diagnosis as I should like, but I simply wish to state that according to the method of diagnosis and the competency in interpreting the findings, the operative technique will vary. After considering all conditions one must decide first whether or not to operate, then as to exactly what should be done, and above all he must be able to give an accurate prognosis. To illustrate: Take into consideration a case where only an incomplete or poorly carried out cystoscopic examination has been made, or where only a clinical diagnosis, "tumor of the bladder," has been made, and where the character, number, site, and extent of involvement is not known. How is it possible to proceed correctly? I assume the attitude, that in order to do a surgical operation expeditiously, accurately, and correctly, it is highly desirable to know for oneself all the facts before proceeding, and not to be informed at the time of operation, as in some instances it might put the operator to great disadvantage, and bad results might follow which might have been avoided had the operation been started with a full knowledge of the case. On the other hand, let one consider a case where all methods of diagnosis with which genito-urinary surgeons are familiar are employed, enumerating the more familiar and important: Cystoscopic examination, which informs one as to the probable character, site, and number of tumors, and allows portions of tumors readily to be removed for pathologic diagnostic purposes; X-ray examination of the air-filled and again with the collargol-filled bladder; the functional tests, as they are carried out in the various ways, of the urine and blood, and all the methods of examination already mentioned. Under these circumstances, with a full knowledge and appreciation of the facts, how is it possible to proceed incorrectly?

It is a fact that deliberate systematic operations for tumor of the bladder date back hardly twenty-five years. In the early days operative interference was carried out chiefly to relieve pain or stop hæmorrhage. The patients as a rule were allowed to run along to a point where their general condition was so low as to permit nothing except the slightest interference. If the growth were permitted to continue, hæmorrhage and sepsis and the results of backward pressure and infection, that is pyelonephritis, would occur. To permit such to occur at the present time would be nothing short of a crime. The first and correct course has been, since the newer methods of diagnosis have been at our command, to elicit at once the cause of blood in the urine or pain in the genito-urinary tract, whether or not associated with the act of urination. Oftentimes infection, pus in the urine, may occur before blood appears. Hence the source must be looked for. It stands to reason that the operative treatment will vary with the findings. I do not wish to cite statistics, as these are often misleading, but it is agreed by numerous authorities that operative results vary with the extent and method of operation. Also the earlier the diagnosis the more satisfactory the results. It is for this reason that I wish to point out what I consider the correct procedures for these cases which at best do not give perfect results. *I can state that fulguration of certain bladder tumors, in my opinion, is the method of choice if the neo-*

plasm is considered benign and if the site is accessible to this mode of treatment. There are, however, factors such as age and other conditions which might cause one to do an open operation.

I shall not touch upon the indications and contra-indications more than is necessary to make my position perfectly clear as regards the open-operative treatment. Clinical as well as experimental work has demonstrated the fact that it is safe to permit sterile urine to enter the peritoneal cavity. Ruptured bladders with urine in the peritoneal cavity for hours have frequently been noted, and recovery has followed operation. Again, every operator has entered the peritoneal cavity either deliberately or accidentally in cases of both sterile and infected bladders and no harm has been noted. But I certainly wish to be put on record that I have seen, in my own as well as in the work of others, cases of peritonitis and death following the deliberate as well as the accidental entrance of urine into the peritoneal cavity during the operation of an infected bladder. For this reason I cannot permit to go unchallenged the statement that no harm results from the transperitoneal operation, and hence this operation should be advised as the one of choice simply because it makes the tumor more accessible.

Not considering intravesical methods of operation, there are only four avenues of approach: the perineal, the pararectal, the vaginal, and the suprapubic. All but the latter are obsolete in the light of every precept of modern surgery. However, where the removal of part of the bladder, if involved secondarily from a growth of the uterus, a vaginal or combined operation may necessarily be considered. Admitting that there may be rare instances where it might be desirable to enter the bladder through the vaginal, parasacral, or perineal route, it will be from my point of view best to omit discussion, and I gladly refer those interested to the literature. This review has chiefly to do with primary growths of the bladder, and hence procedures involving parts such as the uterus, prostate, and bladder secondarily are only touched upon.

This brings the matter up to the suprapubic route, whether it be by the intraperitoneal or extraperitoneal method. As a matter of fact, one and the same principles of surgery apply to both, and for this reason I believe it desirable to consider points that are common to both. For many years there was scarcely any objection to the median-line incision of the skin and the subsequent separation of the muscles parallel to their fibers. The length of incision for thorough exposure is one of importance. The incision which is inadequate for thorough and easy access is to be condemned. In recent years the transverse and semilunar skin incision has been advanced. This permits of the separation of the muscles or the dividing of their attachments to the symphysis and allows operative interference on the pubic arch, as advised by Albarran. Personally I have never seen the necessity for, nor any advantages from, this incision, and cannot advise its general use, admitting that such an indication as perivesiculitis of the urinary bladder might make it worth considering. Transverse incision of the bladder itself has been advocated. I can see no advantage over the usual incision. The bladder can be incised in any direction without any detrimental effects.

Next in order is the question of the dilatation of the bladder, as a preliminary step to the operation. Is it to be filled with sterile air or fluid? No bladder, if infected at the time of operation, can be freed from infectious material by irrigations or the use of antiseptic fluids. For this reason it has been advised to fill the bladder with air so that at the time of opening it there can be no escape of fluid which might carry contamination. It would only be necessary to care for the urine secreted between emptying the bladder and the opening of the same. In certain types of infection, and in cases of intraperitoneal operations, this step should be seriously considered for reasons already mentioned. It must be admitted that fluid will carry infection to every part, and in cases of extraperitoneal loosening of the entire bladder from its natural attachments, an enormous exposure is created and the

parts bathed in fluid carrying germs of infection. The bugaboo of peritonitis and urinary infiltration still pervades the minds of some and causes hesitation as to the best course to take. Unquestionably it is desirable to consider what has already been stated in regard to the preparation of the bladder. Certain consideration must be given to removing as much débris as the naked eye will permit, and the use of antiseptic fluids which retard or even destroy the bacterial growths which come in contact with the same is to be recommended. In instances where it is deemed best to avoid entrance into the bladder and peritoneal cavity at the time, there has been advised by Mickulicz, and frequently carried out by myself, the transverse incision of the peritoneum at the point of the attachment of the bladder before entering the bladder, and suturing the same to a point or line of the bladder-wall sufficiently distant to permit extraperitoneal work on the bladder, yet with the bladder-wall covered with the peritoneum. In those cases where the tumor is so situated and where it is also considered best not to perform an intra-abdominal operation, I consider it a justifiable procedure. It is within the laws of surgery and certainly is an acceptable step, provided the location of the neoplasm is thoroughly understood before commencing the operation. I have always stated that before proceeding or contemplating a bladder operation for tumor, the operator should be thoroughly informed on every point. If this is the case this little point may be of great value in certain selected cases. The fear of urinary infiltration was such that the suprapubic route was not even considered with great favor, although Guyon insisted that it was, even with the drawbacks of the surgical technique of his time, the route of choice.

To overcome the infection of the prevesical space and so-called urinary infiltration, many questions of importance have arisen as to the best course to pursue; whether or not complete closure of the bladder, implying the question of drainage, suturing of the bladder to the abdominal wall, drainage of the spaces, suturing of abdominal wall, and method of closure of the skin incision, use of a permanent catheter or regular catheterization in order to keep the bladder free from urine and avoid overdistention of the bladder, the question of suture material and the method of employment as regards the stitch, and many other points of vast importance to the welfare of the patients. In reviewing his results von Fritsch regretted that he had attempted to close the bladder, although he did so only in clean cases and excisions of small tumors. Kolischer and Schmidt, 1907, advised against the use of permanent catheter and drainage, depending on spontaneous urination or regular catheterization. Mayo, 1908, has also taken this course. In following this procedure I can only insist that careful watching is desirable, and that catheterization must be carried out according to the demands of the individual case; if this is not done drainage must be considered, and I believe this was the cause of the bad results recorded by von Fritsch. If bladder drainage is instituted, questions of minor importance arise, as to whether interrupted suture or purse-string suture are to be used, also as to whether or not the drain is to be sewed to the bladder. This should be done with fine, readily absorbable interrupted catgut, the suture not taking in the mucosa. This question does not entirely, except in some instances, depend on whether or not infection is present. Of all cases examined cystoscopically after operation I have never had any reason to regret this procedure. In large resections I have frequently taken all coats but do not deem it absolutely necessary. Mayo and Judd use for closure of the bladder wound a running or mattress suture, as advised by Connell, reinforced with silk or linen, and using the Cushing parallel peritoneal stitch. O'Neil uses catgut and closes in two layers. Kolischer and Schmidt, 1907, discussed this question and advised that all coats be included; in smaller incision, however, this is not necessary. Even kangaroo tendon has been advised for bladder work. I cannot see the necessity for using chromic catgut. This has been my personal experience on a large series of cases. If not through all layers one may avoid stone or incrustations. Too

quick absorption has been put down as permitting secondary hæmorrhages. In order to overcome the spaces above and below the line of incision, if latter is in medium line of bladder, sutures can be applied through the bladder as if closing the bladder in stages and bringing to the abdominal fascia, thus obliterating these spaces. This can even be done in those cases where the opening of the bladder is on a lateral surface, yet the suturing of the bladder can be made in the median line to the abdominal wall. To avoid unnecessary spaces and to lessen the area of infection I consider it a good procedure not to strip or loosen all the prevesical fat but to incise it at the time of opening the bladder, and to permit it to remain undisturbed. I cannot insist too strongly on this point. To strip off the peritoneum from the bladder is a different matter and must be done if some of the operative procedures to be suggested are to be carried out. Rubber tubing may be placed under the symphysis or at the lower angle of incision, or, again, a small drain to the lower point of the incision, which may be on the posterior surface of the bladder or on either side if the entire bladder is enucleated as advised by Squier. In the intra-abdominal operation Mayo has advised the drainage of the peritoneal cavity in certain cases. If necessary to drain the bladder I have never had occasion to regret the use of glass drains. On removal, the slough which is always present with the use of rubber tubes is entirely avoided. Personally I have not found it advantageous, if drainage is used, to advise any of the different forms of apparatus devised for drainage. The simple syphon has given satisfaction.

Before taking up the subject in detail I wish to refer to some facts bearing on the subject which have a deciding influence. Lymphatics of the bladder are comparatively few and inactive. This being true, metastasis is delayed, and for this reason a malignant tumor, at least in its incipiency, may be regarded as a local condition and curable by resection, particularly so if all coats of the bladder and adherent tissue be removed *en masse*. Zuckerkandl, Harris, Rovsing, Schmidt, all agree that three-fourths or more of the bladder may be removed and a good functionating bladder result. My personal observation, ten years after operation following excision, except for trigone and internal urethral orifice, shows a bladder which is in no way different from a normal bladder. Watson has removed the unopened bladder and used the intra-abdominal route. Mayo, Casper, and others believe that if the operative field is not sufficiently large, neoplastic tissue can easily be transplanted into abdominal wall or space of Retzius. Personally I know of several cases of this kind. Even with good exposure this is possible and hence it has been advised to sear with the thermocautery the surface of the tumor, or treat it otherwise to prevent this occurrence. Cup-like forceps, devised by Zuckerkandl to grasp and enclose the tumor, have been used to prevent contact with surrounding tissue in order to avoid this transplantation.

It must be admitted that there are many failures in the surgical treatment of tumors of the bladder. I have already discussed the tendency of tumors to change character, and also their tendency to recur, whether true or false in character. But there are other causes of recurrence than incomplete removal, and I agree with Squier that an operation performed on a patient who has not been thoroughly examined is not satisfactory. If the bladder is not sufficiently exposed to permit of accurate work then not only the attached tumor with surrounding healthy tissue is not removed, but metastatic or transplanted tumors elsewhere in the bladder are overlooked. Besides, without a thorough previous understanding many operations are commenced and one finds himself unable to perform a radical operation if it is deemed necessary.

There are practically only two types of operations:

1. Palliative —
   a. Cystotomy.
   b. Exclusion of the bladder.
2. Radical —
   a. To excise or resect.
   b. Total cystectomy.

In excision or resection the flow of urine is not deviated even if there is transplanta-

tion of ureter in some other part of the bladder, *but if total cystectomy is considered, the urinary flow from both kidneys must be deflected as a preliminary step*, later followed by cystectomy. However, removal of the bladder has followed in some instances at one and the same time. I do not hesitate to state most emphatically that experience is lacking with many surgeons as regards the operative interference on the bladder, and I must admit that the sum total of recorded cases of some of the operations advised is rather limited; besides, the results shown are not of such astonishing nature, and it requires great courage of conviction to insist upon and to carry out certain procedures which up to the present time are condemned without sufficient reason. The future holds in store the proof as to whether or not the operations which are carried out only occasionally at the present time are worthy of greater use. To illustrate this point, most continental surgeons agree that malignant involvement of any portion of the trigone, internal urethral orifice and prostate, contraindicates any operative attempt at resection or extirpation of the bladder. Up to the present time there is no definite understanding as to the selection of cases for resection, as there are those that believe that any malignant growth excludes the possibility of radical removal except by total cystectomy. On the other hand, there still is some discussion as to the best procedure in cases regarded as benign papillomata, although other than papillomatous tumors of benign character are often removed. To complicate matters, there are many who advance the idea that no tumors of the bladder are clinically benign. As to whether excision is to be preferred to high-frequency: apparently in the past few years the latter has been preferred in cases of papillomata. I cannot permit sufferers belonging to the class involving trigone, etc., to gradually become worse. The questions of extent, and character of growth, certainly should be taken into consideration. The continental surgeons probably would wait for the opportune time to do simply a suprapubic cystotomy. But if one or both ureteral orifices were being occluded, why not consider diversion of the urinary stream, at least even if no cystectomy could be carried out? And in the case of the neck of the bladder being involved, why not attempt Young's operation or some modification as a radical cure, at least in the incipient cases, even if cystectomy is considered contraindicated? This topic bears directly on the operations for cancer of the prostate gland. Several well-known operators previous to 1900 — Kuster, Fuller, and Leisrink — removed glands, vesicles, and the neck of the bladder. In 1904, Young brought the entire matter up again and I believe it is worthy of consideration.

Without too great detail the operative technique of Young's operation is as follows: (1) The bladder is thoroughly irrigated and emptied. (2) The patient is placed in the exaggerated lithotomy position. (3) The field of operation is prepared. (4, 5, and 6) An inverted V-incision and dissection exposes the bulb and central tendon. The latter is cut, and the muscle is exposed and the rectum is separated from the urethra, prostate, and seminal vesicles. A sound is placed in position. An incision is made into the membranous urethra, Young's tractor is introduced and transverse section of membranous urethra is made in front of the tractor. Then with traction the puboprostatic ligament is exposed and divided, permitting an easy sweep around the prostate and neck of the bladder. With traction, the loosened structures are easily brought down. Now an incision is made on either side, in front of the ureteral orifices. The vasa deferentia are pulled down, tied off, and cut across. This permits the seminal vesicles to be brought down, and the entire mass with adherent tissue is removed. (7 and 8) Then the vesical opening is anastomosed with the membranous urethra and the floor of the bladder is closed. (9) The bladder is drained per catheter, the spaces per perineum.

In regard to malignant tumors of the bladder, and I fully understand the possibility of mistaking the character of so-called benign tumors at time of operation, it will be well, after exposing the bladder, to palpate the base and surrounding healthy tissue,

and to explore within, after opening the bladder, before deciding the question of resection. I assume the attitude that whenever it is possible to outline with ease and accuracy the parts involved, even if involvement includes the ureteral orifices, it is justifiable to resect the healthy tissue outside the tumor 2 or 3 cm. If the ureteral orifice is involved, resection of it with neoplasm can be made in the classic manner. If this is done ureteral implantation into a healthy portion of the bladder necessarily follows. I firmly believe that the results warrant the procedure and hence do not advise diversion of the urinary stream and cystectomy in these cases. A recurrence may again call for further resection, or operation including diversion of the urine and cystectomy. As it is quite certain that in at least a limited number of so-called benign papillomata, the pedicle has been known to infiltrate the bladder-wall, the question of resection instead of excising has frequently been brought forward. Personally I have done so in cases of long standing, always if there was doubt as to the character, and believe that it is well to do so. Naturally where there are numerous tumors distributed over the entire inner surface this cannot be done. However, I have made a resection where there were 25 or 30 small benign tumors in an area of about 6 cm. in either direction. In cases of papillomata in and about the ureteral orifices, preliminary ureteral catheterization should always be carried out. Resection of the bladder-wall or excision of the tumor is greatly simplified by this procedure.

In the last few years the high-frequency mode of treatment has apparently given universally good results and I have about fifty cases of my own. As this subject is to be thoroughly reviewed by others I merely take this opportunity to insist that it is the most suitable mode of treatment. To neglect it is a surgical error, unless there be some definite reasons, such as hæmorrhage, size of the tumor or its location, which are scarcely possible, for its contra-indication.

In this outline I have no pet theories or special operations to advance and hope that my experience has permitted me to select the best that has appeared in the literature on this subject.

In taking up the palliative operations, how is it possible to select the cases correctly? I need not state that it frequently becomes necessary to do so for other than surgical reasons. This matter cannot be discussed. If an individual shows signs of cachexia or if metastatic conditions are present, or if loss of blood from ulceration of the bladder tumor, or again if pain is excessive as when the internal orifice is involved, it is justifiable to perform the suprapubic operation in the ordinary fashion and remove with curette and scissors or otherwise, and cauterize with thermocautery, "spark" with the high-frequency current, or "bake" with diathermy, the parts involved. It is needless to state that these cases demand the establishment of a permanent outlet for the flow of urine. This treatment may be carried out from time to time as found necessary. It also demands the wearing of a urinal. Naturally the question of X-ray therapy and radium or mesothorium treatment is of special interest at this point. However, the question will arise, why use this mode of treatment in these advanced cases only? I believe this can be readily answered at the present time. Neither the modern X-ray treatment for deep-seated growths nor the application of radium for growths involving the bladder, have as yet been sufficiently tried out to prove them of sufficient value to replace other surgical procedures. However, it must be understood that either or both, if carried out according to the precepts already known, may be used to advantage. I certainly do not believe it wise to rely entirely on one or both, but I have knowledge of one case which has been, to all cystoscopic and other evidence, freed from malignant growth. I must insist in the present state of our knowledge, that it certainly is advisable, I might even state correct, to treat all cases before and after operation, and all cases not operated upon, with the X-ray. I do not feel quite certain as to radium or mesothorium therapy. It remains to be proved whether it is good practice in cases which have been operated upon and apparently not freed from the growth.

But for the advanced cases it certainly must be taken into consideration, as urinary fistulæ do not give the necessary relief. I believe, if no contra-indications of a grave character are present, that exclusion of the bladder should be seriously considered. It is a well-known fact that in cases of tumor of the bladder of malignant character not showing cachexia or metastasis that simple curettage of the portion involved has apparently resulted in a cure. But on the other hand many ill results, such as urosepsis, have frequently followed. It is true that sparking with high-frequency current probably will avoid these untoward results. But diathermic treatment, as it is carried out at the present time, unquestionably is the method of choice, and should be preferred rather than simple curettage and simple cauterization or use of the ordinary high-frequency current. I have had experience with the modern methods of treatment and refer to them from this standpoint, not simply from a theoretical view. Whenever one or both ureteral orifices become involved to such an extent as to cause damage to one or both kidneys, or whenever the establishment of a simple urinary fistula cannot or does not give the necessary relief, I believe, if no contra-indication of a grave character is present, *that exclusion of the bladder should be seriously considered.* Up to the present I have not been convinced, and I must admit that I may be acting incorrectly, that according to some authorities the right procedure is, as soon as a diagnosis of malignant growth of the bladder is made, to advise and to carry out diversion of the urinary stream and removal of the entire bladder. To take this attitude, with the knowledge of the results of treatment of so-called benign papillomata, and the results of carefully carried out resection of the bladder, is a step a little bit too advanced for me to assume.

At this point I wish to call attention to direct transfusion in cases of long standing hæmorrhage, particularly if the result of a benign tumor, and also as a preliminary step to operation in cases of malignancy. Lespinasse has seen good results following this procedure. I believe the usefulness of the operation, meaning the benefit which it offers, has as yet not been proved.

"Palliative exclusion" has not been sufficiently tried out in connection with malignant tumors of the bladder, but I am convinced that it will be given further attention as the subject of tumors of the bladder is better understood. I mean by this term, exclusion of the bladder, nothing more or less than the diversion of the urinary stream from the bladder. In reviewing the literature on the subject, I believe that Maydl's operation for exstrophy of the bladder was what gave origin to the thought in connection with the subject under discussion. I can readily believe that if a patient possesses control of micturition, even though it be through the rectum, it gives considerable satisfaction. Incontinence, even if the wearing of a urinal keeps the patient dry, is the cause of depression and despondency. If there were no disadvantages to the former, I do not doubt that it would be the method of choice. But many questions of great moment arise, the paramount one being where to direct the stream. If to the back, with aid of ureteral fixation to loin with double nephrostomies, incontinence is present and requires constant care and carrying of urinals. This subject has been thoroughly discussed by Watson, and recently Peterkin has urged this course. However, I am inclined to believe that if it were possible without fear of ill results to lead the urine to the bowel it would be desirable, as then it could be readily evacuated. Under the circumstances it probably will be best if I do not discuss the subject in too great detail, as to where the transplantation or anastomosis is to be made, whether high in the large intestine, or in an excluded portion of the sigmoid or rectum, or whether to create a new bladder. It is a matter of such importance that the danger, disadvantages, and discomforts must be considered before carrying out the diversion of the urinary stream: if led to the bowel, then in such manner that it can be easily evacuated; if to the sigmoid, this usually becomes impacted with fæces and makes this site objectionable. Whenever implantations of ureters are made into the bowel it must be admitted that as-

cending infections of the kidney are the rule. If this could be overcome it would be the course of preference. If to the skin, urinals must be worn. These are often times unbearable and besides do not always keep the patient dry. The urine is often the cause of severe inflammatory reactions in the skin. These fistulæ permit incontinence, which fact is often depressing to the patient. Infection of the kidney following this procedure are not so common, and from this point of view, considering length of life particularly, it is to be preferred. Besides, when considering all, the operation is accomplished without much danger and hence may be more desirable chiefly in cases of lessened general resistance.

Undoubtedly if palliative cystotomy gives no relief, and if it is possible to prolong life and free the patient from pain, deviation of the urine must be considered. It is needless to state that cystectomy need not be advised except in selected cases, and then it makes the operation a radical operation for the removal of the tumor.

Before taking up the subject of resection of the bladder, I believe in order to round out this subject that it is advisable for me at least to mention the Heitz-Boyer-Havelocque operation for the creation of a new bladder. It is divided into stages:

(1) Abdominal dilatation of the anus, median umbilical incision, exposure of the colon, and the rectal ampulla dilated. (2) Section of the large intestine as well as adjacent peritoneum, the two ends temporarily closed by purse-string sutures. The rectal ampulla is pushed forward. The closure of the lower end of intestine is completed. The retrorectal space as far as the tip of coccyx is dug out. The rectum which becomes a bladder is closed by a peritoneal row of sutures. (3) Of the two ureters, the left is implanted in the new bladder, the implantation being hidden by a peritoneal fold, the right implanted in a similar manner, if possible, or according to the method of Payne. (4) Finally, the superior colic end is invaginated into the "dug out" retrorectal space, the pelvic and iliac colons having been brought down to their utmost, and then closure. (5) Perineal step, through the retroanal incision following the posterior face of the rectum there is done a transverse fluting for a little less than half the circumference of the gut, in the posterior portion. The superior colic extremity has been drawn up. The colic extremity is invaginated. The operation may thereby be described as under one for continence of the urine. This is assured by the anorectal sphincter. The end-result gives two new conduits, one fæcal, the anus being the end of the intestinal tube, the other urinary, with new ureters ending in a created bladder.

At the present time the limit of resection depends entirely on the view of the operator. I hope that I have made myself clear on this subject, as I have already discussed the different aspects. There are statistics that are misleading. But why refer to statistics? They are and always have been used to deceive. If they support the views advanced they are quickly used, if they do not they are adroitly omitted. Even statements of individuals can be used in the same manner. I do believe, however, that it is possible to place great weight on statements and facts, particularly if advanced by operators of known ability and veracity. Extensive resections of the bladder are performed with increasing frequency and probably the results are better than formerly where boldness was lacking. I must admit even where generous removal of the tumor in surrounding tissue which is apparently healthy has been done, that the question of the surgery of known malignant tumors has as yet not been settled by any means. I can only review my own cases, see the good and bad and analyze the results, and note the reasons thereof. In a large number of cases I can readily see the error of my ways. Take for instance growths of long standing, known possibly by their hæmorrhages, even if favorably located, which terminate as a rule unfavorably. Even if all the adherent tissue and, if present, retroperitoneal glands be removed *en masse*, I doubt whether one could expect a permanent freedom of recurrence and metastasis. It is in these cases as well as those where tumors are unfavorably located that

diversion of the urinary stream and cystectomy will have to be considered. There are surgeons of known thoroughness and ability who do not even recognize any possibility of success, no matter how extensive a resection be made, but at once urge diversion of the urinary stream and cystectomy. Permit me to outline in a general manner various operative interference, the choice of which for the present must remain with the surgeon. Needless to state, one should carefully consider the advantages and disadvantages before proceeding with the individual case under consideration.

I shall briefly state the mode of procedure in the abdominal or transperitoneal method of operation.

STEPS OF THE OPERATION

The steps of the operation are: (1) The bladder is thoroughly irrigated and emptied. (2) The patient is placed in the Trendelenberg position. (3) The field of operation is prepared. (4) An incision is made in median line from pubes upward above and to the left of the umbilicus or higher if necessary, not entering the peritoneal cavity, however. (5) The prevesical fat is gently pushed aside and it is, in my opinion, desirable not to disturb the fat more than is necessary. Depending on the location of the vesical tumor the question of extent of stripping the peritoneum will arise. If the tumor is only on the lateral wall the midline attachment of the peritoneum to the bladder may be allowed to remain undisturbed and the lateral corresponding half of the bladder can practically be enucleated with the greatest ease. If the growth is situated more in the median line the lateral spaces can be left practically undisturbed. If, however, the tumor is in the median line on the posterior wall, it may be necessary to enucleate the entire bladder except for its attachments at the pubic arch. (6) With the tenaculum forceps the bladder is picked up and is opened at the desired point, etc., as per sixth step, in description of the transperitoneal operation. (7) Closure of the bladder-wall. (8) Closure of abdomen. (9) Post-operative treatment.

In connection with this operation many details have already been discussed in a previous part of the paper, but I wish to refer particularly to some others. It is to be thoroughly understood at the outset that thorough exposure is desirable; that whenever there is the slightest question of involvement or adherency of the tumor to the peritoneum, it is to remain undisturbed and the transperitoneal operation added; or, if it is possible after the peritoneum has been opened transversely anterior to the growth, to bring the free portion of the peritoneum which lies anterior to a point some distance posterior to the adherent peritoneum and then suture these together. This makes the involved area covered with a layer of peritoneum an extra-peritoneal operative condition; in other words, making a simple "exclusion" of the bladder-wall involved. This in turn again permits one, if the bladder has not been opened, to proceed in the manner as already described. I wish to state that it is well not to distend the bladder too much. If overdistended stripping becomes dangerous and damage to the bladder-wall may result, or one enters the bladder at a time when it is not desirable. There are numerous steps recommended and known by personal experience that can be used in selected cases. It will be well to mention them. Proust advised if the growth is so located in the vertex or even on the lateral wall that the area involved can be easily palpated from the outside, that curved forceps be applied some distance from the growth to both external surfaces of the bladder, and in this manner remove without opening the bladder. Then with appropriate suture, close with one or several layers. This avoids to some extent the transplantation of the tumor by any unnecessary handling. It is a clean and satisfactory method in selected cases. Hagner locates the neoplasm cystoscopically and while the cystoscope illuminates, sutures are placed at sufficient distance from the growth so that incision can be made without the unnecessary cutting of the bladder. Kolischer and Schmidt, in 1906, recommended cystoscopic examination in order to locate the growth as accurately as possible, and then to make the initial bladder incision a suf-

ficient distance from the growth, and next by palpation to resect according to the needs. They also advised the closure of the bladder. This does away, as does also the Hagner method, with the usual incision of the bladder in the median line, which, needless to state, is entirely unnecessary in the class of cases where these methods can be instituted. It certainly is desirable to do away with any unnecessary incisions; in fact, the results are better. After resection of the bladder, even if extensive, the question often will arise in case of recurrence whether or not a further resection is advisable, whether deviation of the urinary stream and cystectomy are in line, or whether it is advisable to wait and do an old-time palliative suprapubic cystotomy. I believe, and in order to emphasize, I repeat that the extent of a resection depends on the individual viewpoint and experience of the surgeon. For this reason I do not advise total excision of the bladder when a growth is favorably located, but the question as to why not do so as soon as a malignant growth has been established, becomes more and more apparent. I have refrained from using statistics, as I believe that they are not a fair weapon to decide this momentous question. At this place I believe it desirable to make clear a few facts having a bearing on papillomata of the bladder. Although subscribing to the belief that all growths of the bladder have a potentiality to malignancy, I cannot agree with some authorities in treating all bladders involved with this character of growth by either resection or cystectomy. I have already insisted that all growths belonging to this type should be treated with the high-frequency current. If too large, and this is not a positive contra-indication, or if hæmorrhage, or some condition exists such as contracture or irritability of the bladder, or if the location is accessible, is it justifiable to operate? Under these circumstances it is unquestionably imperative to remove them, but the question will arise whether by resection or excision. I may be taking a backward step, but I still believe that with a simple but thorough excision of the base, the terminal results are satisfactory. I appreciate the fact that Lichtenstern at Zuckerkandl's clinic has shown a malignant growth at the site of excision of a benign papilloma. Also that a certain number of tumors having all the clinical appearances of a benign tumor are actually malignant. This has been repeatedly shown by pathologists to be a fact. Right at this point the question of removing pieces by intravesical methods for diagnostic purpose comes up. I am not an advocate of this, for the question of cases of doubt can rarely ever be decided in this way. I believe that the base of the tumor as a rule is necessary in order to show the presence or absence of signs of malignancy, and that malignancy does not commence at the periphery whence the parts are obtained by intravesical methods for examination. To be more explicit the, steps of the operation are:

The first, second and third steps are the same as in the previously described operations. The fourth is the same as in the extraperitoneal operation. (5) Without loosening the attached fat, sometimes pushing upward the peritoneal fold in order to permit of a good liberal incision into the bladder, pick up the bladder with a tenaculum or with heavy silk suture at the angle of peritoneal attachment, draw the bladder upward and forward and incise the fat which has been left undisturbed on it. At the same time carry the incision downward toward the pubes without withdrawing the scalpel until the incision is of sufficient size to admit easily tractors of varying size and shape.

Naturally all swabbing, protection of abdominal wound with pads, and other details sufficiently described and known are in order. Forceps devised by Zuckerkandl, which are spoon-shaped, in order to enclose the entire growth and prevent transplantation, may be useful in individual cases. The kind of tractor to be used, whether wide or narrow, long or short, whether one above or below, or two at either end, or upper external angles, will depend on the individual and on the location of the growth. Elaborate and self-retaining retractors for bladder work may be all right in the hands of some, or even in certain cases might be of help, yet one can get along nicely without them. The object of retractors is to make the growths easily

accessible. I do not as a rule resect the bladder for true papillomata. However, I have already advised where numerous growths are within a certain area that the procedure of resection should be the same as in the cases of malignancy. In many cases the growths are located at or near the ureteral orifices, and it is good practice to catheterize the ureter corresponding to the side involved, before commencing the operation, in order to facilitate the surgical procedure which is found desirable after the bladder has been opened. I believe in a thorough excision. The more pronounced the pedicle the more liberal the distance from the pedicle is the incision made. If any induration is apparent at the base or there is any reason to believe malignancy present one should resort to a resection, even if it necessitates resection of ureteral orifice and implantation of the ureter. I firmly believe that after the incision through the mucous and muscular wall with scalpel or appropriate scissors the edges should be united with catgut and hæmorrhage stopped in this manner. As a rule I do not use the thermocautery or diathermic current to stop the bleeding, nor after or before suturing or cauterization do I advise "sparking." I believe that this is an admission of incomplete excision or resection. If it were to do any good in a malignant condition it would have to be done with such intensity that a certain amount of sloughing would result and produce complications.

The remaining steps are the same as in the previously outlined operations. The conditions which arise have already been discussed elsewhere and all these vary with the exigences of the case.

Under radical operations (No. 2, type b) I wish to discuss total cystectomy.

I have repeatedly stated that there is at the present time no standardization of cases permitting one immediately to advise this procedure for certain cases. I must admit again that the operation will probably only grow slowly in favor until more definite ideas as to the true value of all the aforementioned operative procedures have been definitely shown to be wrong. On the other hand I hardly believe that it will be forgotten, for there are certainly individual cases where it will always be admissible. But it is here that the argument of early operation can be brought to the fore at the present time by the advocates. Why use or commend it as a last resort in cases already known to be beyond operative help? It is right in this large and dangerous group where one will probably be obliged in the near future to decide in its favor. For the present I am not convinced that incipient, easily accessible malignant growths or any apparently benign growths demand this procedure. And in the somewhat advanced cases, can the length of life be increased or the comfort of the patient be made more certain? These are again questions which the future must clear up. The operation for total extirpation of the bladder must necessarily be divided into two steps. The first, which has already been discussed under the palliative operations, consists of directing the urinary stream. The second part or cystectomy which follows immediately, if the condition of the patient permits or may be carried out at a later period if considered desirable, may be made in the following steps:

The first, second, and third steps, are the same as in the transperitoneal or extraperitoneal operations for resection of the bladder. The fifth step depends on the fourth. If the transperitoneal operation is done, walling-off of the intestines, etc., should be practiced; if extraperitoneal, then the bladder should be completely enucleated from all of its pelvic attachments. There is a difference here in the male and female as regards further surgical procedure. Pawlick in 1888 did the first total cystectomy on a woman, and it is worth stating that the ureters in this case were implanted in the vagina. After removal of the bladder the anterior portion of the end of the urethra was sutured with the posterior wall of the vagina, practically making a bladder out of the vagina. (6) In Pawlik's case the bladder was enucleated from above, the anterior vaginal wall was then incised and the bladder drawn through and cut across just above its outlet at the beginning of the urethra and removed.

In the male as well as in the female extraperitoneal enucleation is to be preferred. Naturally if the growth be somewhat advanced and the peritoneum attached to the bladder-wall, the operation becomes an intraperitoneal one. In the first step the ureters have already been tied off with two ligatures, each as far distant from the bladder as is possible, and cut across between the ligatures. Now continue the enucleation of the bladder with the attached seminal vesicles and prostate, meanwhile having tied off both cords. The prostate and vesicles are easily separated from the rectum. A median perineal incision is then made and the bladder with attached vesicles and prostate are drawn through the opening and the membranous urethra tied in two places and severed between, permitting complete removal of all parts intact. It is naturally desirable to empty the bladder before bringing the parts out through the perineal opening. (7) Closure of the peritoneal cavity. (8) Closure of abdomen. Drainage of the space through the perineal opening. (9) No catheterization is necessary unless an artificial bladder has been established, as in Pawlik's case.

Since the time of Bardenhauer, who first carried out total cystectomy, many changes have taken place. Naturally, the question arises in the first step of what to do with the ureters so as to cause diversion of the urinary stream? In the second step whether or not transverse abdominal incision permits better exposure? Whether intraperitoneal procedures are necessary in order to better remove glands if involved? Whether symphysiotomy or resection of the pubic arch is desirable, whether combined suprapubic and perineal operations are to be considered? The handling of the attached portions of the ureter, the question of removal of the vesicles, of the prostate, and even of both cords with the testicles, have all been more or less discussed and proposed by various writers. Watson, who has taken such a prominent stand for this operation, lifts the bladder high out of the abdominal wound and passes a double ligature through the median line of the posterior surface at the lowest part of the neck, letting the needle emerge through the anterior wall at a corresponding point, and then ligates the neck of the bladder in two halves and divides the bladder by a transverse incision. He advises a counter drain through the perineum and complete closure of the abdominal wall. He states that if the vesicles are involved they should be removed. The cords must be ligated, preferably near the inguinal ring, and removed. He further states that the prostate can be removed with the bladder by simply changing the site of the ligatures from the neck of the bladder to the urethra at the apex of the prostate and tying again each half as previously described. I personally have always carried out, and see no reason why it should not always be done, removal of vesicles and prostate. I believe it to be imperative to remove all *en masse* with adherent fat and tissue.

THE DESICCATION TREATMENT OF BLADDER TUMORS

By EDWARD L. KEYES, Jr., M.D., F.A.C.S., New York

THE desiccation treatment of bladder tumors consists in the application of the high-frequency electric current to the bladder tumor by means of an insulated wire introduced through the cystoscope.

The method was introduced by Edwin Beer,[1] in 1910. He employed the monopolar, or Oudin current, in essentially the same manner as it is used at present. In the same year I employed the bipolar, or d'Arsonval current,[2] but subsequently abandoned this in favor of the Oudin current.

Before proceeding to a description of the treatment and its results, let us briefly discuss:

1. The employment of the high-frequency current in preference to the thermocautery during suprapubic operation.

2. The relative advantage of the monopolar and bipolar currents.

HIGH-FREQUENCY CURRENTS WITH SURGICAL OPERATION

Since its introduction this method of treatment has been employed either for the removal of tumors or the destruction of their bases during suprapubic operation. Perhaps there is some real advantage in this; perhaps it is simply a matter of convenience. Sufficient clinical evidence has not yet accumulated to permit us to decide the point. I fancy the actual cautery is all we need.

RELATIVE MERITS OF SINGLE AND BIPOLAR CURRENTS

But the Paquelin cautery cannot be employed through the urethra; even the electrocautery used by Nietze was a relatively clumsy instrument. To all intents and purposes the high-frequency current introduced through the cystoscope merely gives us a practical means of burning bladder tumors.

The effect of the monopolar current is a relatively superficial desiccation, or electrocoagulation, while that of the bipolar current is a deep baking or thermopenetration. At most the monopolar current can cause nothing more than a relatively localized burn, while the bipolar current, if used in sufficient strength, can destroy the vitality of almost any extent of tissue. This well-known fact constitutes both the danger and the seduction of the bipolar current. Many operators hope by its use to destroy even the carcinomatous base of a papillary bladder tumor. But the clinical experience thus far accumulated impresses one with the conclusion that a vicious malignant bladder tumor, however small it be, cannot be controlled by electricity in any form. It is only tumors of relatively slight malignancy that can be successfully treated by electrocauterization, and for these the monopolar current is quite sufficient and safer. Its action may be better controlled; the danger from grave hæmorrhage following its use is probably less.

WHAT TUMORS ARE SUITABLE FOR CYSTOSCOPIC DESICCATION

Pathologists are no more agreed than ever they were in the classification of tumors of the bladder. Instances of contrary diagnoses multiply. In such cases a competent pathologist examines a tumor removed suprapubically and pronounces it carcinoma. A few years later the tumor recurs, is again excised, and the same pathologist, in violation of his previous diagnosis and the case history, pronounces it papilloma. Hence, I cannot concede any peculiar diagnostic value to the cystoscopic excision of small bits of tissue, except in cases apparently carcinomatous, upon whom one hesitates to perform a grave and mutilating operation without full pathologic justification.

Furthermore, Lower, I, and others have reported apparent cures of carcinoma by the desiccation treatment. Such being the case, it is futile to say that carcinoma should be

[1] J. Am. M. Ass., 1910, May 28.
[2] Am. J. Surg., 1910, July.

treated by the knife, papilloma by electricity; for some carcinomata can be cured by electricity, while some papillomata (as we shall see) require the knife.

But perhaps the best pathological basis for distinction is that suggested last year by Chute in the chairman's address before the Genito-Urinary Section of the American Medical Association. He describes the cure of a single case of vesical carcinoma after excision with only part of the muscular coat, and contrasts this with the failures that have followed wide excision in other cases. Hence, he concludes, the carcinoma that is papillary in appearance and has not deeply infiltrated the muscular coat, may sometimes be cured by the limited operation.

Such is the type of carcinoma that may be cured by desiccation. But Dr. Chute is the first to recognize the difficulty in distinguishing such a tumor from its more destructive brethren. Indeed, his chairman's address was a plea for more extensive operation. To this we all agree.

If a malignant bladder tumor is to be operated upon at all, it must be operated upon promptly, excised widely, and the involvement of pelvic lymphatics taken into account.

What then constitutes clinical malignancy? What tumors should and what should not be submitted to cystoscopic desiccation?

Some years ago I endeavored to lay down rules for this clinical distinction, and further experience has not materially changed my opinion. The four contra-indications to cystoscopic desiccation are:

1. Hardness of the tumor.
2. Intractable cystitis.
3. Sloughing or ulcerated tumor.
4. Multiplicity and size of tumors.

Some of these contra-indications are not absolute, and all may be elucidated by a few words of description.

Hardness of tumor. The hardness of a vesical tumor may be appreciated in several ways. Rectal or vaginal touch may reveal an induration in the region of the trigone; bimanual palpation may disclose the presence of a large infiltrating tumor; or cystoscopy may reveal an ulcerated indurated carcinoma. All such conditions, we repeat, contra-indicate cystoscopic treatment.

Intractable cystitis. In the four years since Beer introduced the desiccation treatment, I have never seen a case of intractable cystitis that was suitable for intravesical treatment. The patients suffering from relatively benign papilloma may, it is true, suffer from time to time the most intense cystitis. But this can be relieved by the ordinary bladder irrigations to the point of ameliorating the patient's suffering, and permitting desiccation.

But the real intractable cystitis is not appreciably relieved by any local application; is only intensified by the introduction of the cystoscope; permits only the most inadequate and unsatisfactory observation, and of itself almost prohibits treatment. Such a case when operated upon will be found to have either a sloughing carcinoma, or some condition other than tumor.

Sloughing or ulcerated tumor. A tumor that shows upon its surface any extensive sloughing had better be subjected to the knife. But the mere presence of small sloughs does not forbid all hope of success by cystoscopic treatment. Here, then, the contra-indication is not absolute. Let the cystoscopist, however, proceed with caution, and if a few treatments do not manifestly control the growth, let him waste no further time, but quickly have recourse to the open operation.

MULTIPLICITY AND SIZE OF TUMORS

The contra-indication here is even less definite than that of sloughing. Multiplicity of tumors is a perfectly obvious suggestion of malignancy. Such malignancy may be of two types. The multiple papillomata either spring from an underlying carcinoma (often an infiltration from the cervix uteri) or are propagated by surface contact. In the latter case the malignancy is a superficial one. Indeed, a very large proportion of bladder papillomata are multiple when first seen. Yet a majority of these are certainly amenable to treatment by desiccation.

Size and multiplicity of tumors, therefore, present a problem in practical surgery rather than a question of malignancy. Every

urologist must decide, in the light of his own experience, whether it is more profitable to cut or to burn a given patient. It so happens that only one of my cases has defied treatment on account of the size or multiplicity of growth. Yet no doubt some of these might have been more quickly cured by the knife. It is noteworthy that though I have verified a cure by cystoscopy ten times, a year or more after the last treatment, none of the ten had more than two tumors when treatment was begun. Three others with multiple tumors (5, 5, and 7) were clean when last seen; but doubtless they will relapse again.

In a certain sense the patient's age bears on the question of malignancy. Thus among my cases there were eighteen with single tumors, of whom all but four showed symptoms before the age of fifty. On the other hand, of the nine with multiple tumors, all began after the fiftieth year.

FAILURE OF TREATMENT

But in order to do justice to his patients the urologist must be quick to recognize, not only the contra-indications to an attempt at fulguration, but also the evidence of failure in this treatment. He is dealing with a growth which is at least potentially malignant. Perhaps the very days during which he is making up his mind as to the advisability of desiccation are those during which the tumor is actually spreading to the pelvic lymph-nodes, thus making a curable case incurable. The fear of carcinoma must be ever in his soul, and a tumor, however small and apparently superficial, that resists desiccation must be promptly excised.

PSEUDO CARCINOMA

It is doubtless unnecessary at this date to insist upon the chronic infiltration of the mucosa about the base of the tumor following desiccation. It simulates an infiltrating carcinoma. It may persist for at least three months, as in Cabot's case, and our only safeguard against it is the knowledge that it was not there when we began treatment, and that it may persist for several months after the last burn. The only serious complication of such an ulcer is staphylococcus infection causing phosphatic incrustations. Such a complication I have seen but once (Case 2).

TECHNIQUE

Apparatus. I am not qualified to discuss the relative merits of various "high-frequency" machines. I have always employed Wappler's apparatus.

Great care must be taken not to derive the source of the cauterizing electricity from one circuit, the illumination from another. The monopolar spark produces a current through the cystoscope (statements to the contrary notwithstanding), and in one instance, at least, the commingling of a direct and an indirect circuit thus produced knocked the operator senseless. (The patient I did not hear from.) Some operators, therefore, always employ a dry-cell equipment for the cystoscope.

Beer maintains that copper wire is preferable to steel. I have no convictions on this subject.

Sparking. I vary the intensity of the current largely with reference to the patient's sensitiveness. When working near the bladder-wall, the smallest possible spark gap must be employed. When well away from the bladder, the insensitiveness of the tumor permits the use of a quarter-inch spark gap. When using this, it is wiser to shut off the cystoscopic light while the tumor is being burned. Otherwise the lamp may burn out.

The accepted duration of each cauterization is 30 seconds. As many cauterizations are attempted at each sitting as the patience of operator and victim permit.

Grave hæmorrhage occasionally follows the operation. Since this seems much more likely to result from a cauterization of the tumor-pedicle than of its circumference, prudence dictates the slower circumferential attack. But this rule has been often violated with impunity.

Frequency of treatment. Since the burned bits of tumor do not fall off for full two weeks, this is the usual interval allowed between treatments. But a tolerant and impatient patient, with a tumor so extensive that it cannot all be treated on any one occasion, may encourage more frequent treatments.

CURED CASES

Case Number	Age When Burned	Number of Tumors	Previous Duration of Symptoms	Number of Burns Each	Time Between First and Last Burn	Cystoscopic Verification of Cure of Each Tumor	
42,237	44	1	.....	4	6 weeks	5.5 years	D'Arsonval. A post-operative relapse.
13,045	58	1	5 years	2	1 week	2 years	
31,843	41	1	5 years	12	5 months	1 year	First four burns elsewhere.
8,736	37	1	11 years	12	7 months	21 months	Died 10 months later of chronic nephritis.
35,636	49	1	8 months	19	6 months	18 months	
4,641	46	1	15 years	4	4 months	2 years	Clinically well after 4 years.
43,040	60	2	3 weeks	5, 5	6 weeks	2 years	Clinically well after 4 years.
43,240	25	1	1 week	2	1 week	1 year	
33,847	68	1	6 years	3	2 weeks	1 year	
145	55	1	4 years	6	3 months	1 year	Clinically well after 2 years.

CONTROLLED

6,647	52	1	2 weeks	2	1 week		Clinically well after 18 months.
43,340	17	1	? years	6	3 months	1 month	
47,236	20	1	1 year	3	1 week	No	Well 14 months later.
46,635	49	1		2	1 week	No	Symptomless.
48,043	29	1		1		No	Symptomless.
349	70	2	10 days	1, 2	2 weeks	7 weeks	
16,648	47	1	2 months	6	7 months	4 months	
17,849	36	1	1 year	3	6 weeks	No	
35,824	45	1	3 months	1		No	D'Arsonval.

RELAPSING

15,841	52	2	2 months	2, 1	33 months	2.75 years, 0	(Case V.)
45,437	61	5	2 months	4, 1, 1, 2, 3	30 months	2 years (4), 0	Post-operative relapse. D'Arsonval. Pathologically carcinoma. Readily controlled. Died cardiac.
35,840	78	5	8 years	28, 4, 3, 1, 1	4 years	2 years (3), 3 years, 6 months	Controlled.
21,035	64	7	4 years	4, 1, 13, 7, 4, 11	18 months	1 year (4), 6 months(2), 0	Controlled.
21,047	60	5	5 years		1 year		Still under treatment

REQUIRED OPERATION

39,445	27	1	10 days	2	1 week		Because of severe cystitis.

Antisepsis. The burned tumor is practically a foreign body and offers an unusually good breeding ground for bacteria. Consequently antisepsis should be especially careful. I am at present employing 1:2000 solution quinine bisulphate as the medium for cystoscopy (as suggested by McDonald).

Care between treatments. The patient must at all times be under a physician's observation. No amount of care can absolutely

eliminate the possibility of cystitis, pyelonephritis, or grave hæmorrhage, any of which call for prompt treatment.

Verification of cure. The cure must be verified by cystoscopy after three months and again after a year, and three years.

COMPLICATIONS

The chief complications following the desiccation treatment of bladder tumors are:

1. *Electric shock* (already mentioned).

2. *Loss of time* in diagnosing a tumor that requires suprapubic section (already mentioned).

3. *Neglect.* The patient may "elope" either because he thinks himself well when his bleeding stops, or because he fears another cystoscopy. Such patients should be cut, when recaptured.

4. *Infection.* Cystitis following cystoscopy must be treated by frequent irrigation with silver nitrate.

I venture to subjoin the only two cases of grave infection I have seen.

CASE 1. Mrs. F., age 53, came to me on February 8, 1913, with a history of hæmaturia a year before, frequent urination since then, and a recent cystoscopic diagnosis of papilloma. This I confirmed, the cystoscope showing a large papilloma to the right of the trigone. The urine was purulent.

The patient was burned 7 times in the following 3 months. As the tumor was reduced a small implantation growth was found on the fundus.

She then remained away for six months and returned, having gained ten pounds, but with her tumor about as large as when first seen. I burned it once and she returned again in February, 1914. I then burned three times. Incrustations formed upon the bases of the tumors; Ewing reported an excised specimen simple papilloma.

She then departed for six months more and on her return (September, 1914) I burned the tumors several times and administered many irrigations with Bulgarian bacilli in various forms, buttermilk, and lactic-acid bacilli. In spite of these treatments the ulceration gradually spread over the bladder, and on February 6, 1915, I performed suprapubic cystostomy, found four incrusted ulcers running from the right side of the urethral orifice up into the fundus and a few small scattered incrustations just above the urethra. No tumor was visible. The ulcers were well curetted and the bases burned well with the actual cautery. The bladder was sutured without drainage. A small fistula opened on the seventh day and closed two weeks later. During her convalescence she was treated by instillations of carbolic acid and irrigations with silver nitrate. In spite of this, six weeks later her incrustations were as bad as ever. Then a dozen injections of bacillus acidophilus relieved her symptoms, resulted in discharge of the phosphatic incrustations, and banished the staphylococci from her urine.

CASE 2. Mrs. J., age 50, consulted me on January 6, 1915, for a violent cystitis of 3 months' duration. I found much pus, many colon bacilli, 0.2 per cent of albumin by weight. The X-ray was negative; the cystoscopy showed extensive papilloma.

As a result of this cystoscopy (though no attempt had been made to catheterize the ureters) she developed an acute infection of the right kidney which subsided at the end of ten days.

I set a date for suprapubic section, and on arriving at the hospital at 9 a.m. found her temperature had risen during the night to 102°. Deeming that drainage would do her no harm I promptly operated, excising one small papilloma near the line of incision (this was reported benign) and removed a great number of others by the thermocautery. The peritoneum was intentionally opened, and a line of very slightly enlarged glands were found following the course of the right internal iliac artery; these were not excised. A small drainage tube was left in the vault of the bladder.

After operation the temperature dropped promptly to normal. The fistula healed in two weeks. Her bladder irritation thereafter was controlled by instillations of 2 per cent carbolic acid.

Two months after operation the cystoscope revealed a single tuft of papilloma behind the right ureter. This was readily burned.

I know of two deaths from infection after desiccation treatment employed by other surgeons. In each case the death was attributed to "pericystitis," but unfortunately the details are not available.

5. *Hæmorrhage.* The sloughs of burned tissue may begin to come away within two or three days of the cauterization; but as a rule they separate in the second or third week. At this time quite a sharp hæmorrhage is likely to occur. The patient should be informed of this that he may not be unduly alarmed, and, if he is out of reach of the operator, his physician should be warned to be ready to aspirate bladder-clots.

Three of my patients have had retention from clots during the second week after a burn; two were relieved through a soft-rubber catheter; the third required the litholapaxy tube, followed by a retained catheter for 24 hours.

Among the two hundred cases collected by Beer there were three instances of severe bleeding.

That the bleeding may come on more immediately is exemplified by the following two cases:

CASE 3. (Communicated by Dr. E. L. Young.) Male, age 40, showed a large papilloma of the bladder which was destroyed in twelve burnings. Three months later a small recurrence was very thoroughly burned, the wire being applied to the base of the tumor. Two days later hæmaturia began and continued for six days, at the end of which time the patient, almost exsanguinated, had to take to his bed. An indwelling catheter was applied, and at the end of 48 hours the bleeding was controlled.

CASE 4. (Communicated by Dr. James A. Gardner.) Male with large single papilloma. Burned fourteen times (d'Arsonval) from July 2 to December 3, 1913. At the latter date he had gained 10 pounds and the tumor was reduced to a relatively small size. After this cauterization he went home, and immediately began to bleed. He was taken to a hospital where his local physician operated, found "a ruptured bladder," and the patient died December 7.

Obviously hæmorrhage is one of those important complications that cannot be fully guarded against but may be controlled by expert treatment.

RELAPSES

Among Beer's collected cases ten recurrences are noted, but no statement is made as to the time of recurrence. In reference to this the cases may be clinically divided into two types: one in which the tumors are few in number and show no tendency to multiply; the other in which multiple tumors at the time of the first examination suggest a tendency to surface inoculation, which suggestion is often borne out by the appearance from time to time of recurrences in various parts of the bladder. Such recurrences cannot be guarded against, either by cystoscopic or operative treatment, though it is in these very cases that the cystoscopic treatment, offering as it does the ideal opportunity for repeated attack upon the neoplasms while they are still young, is immeasurably superior to open operation.

It is further to be noted that careful examination of the bladder in such cases usually discloses a number of small tufts that may be burned off very readily, thus preventing the development of further tumors.

But the relapses with which we are particularly concerned are tumors occurring at the point from which a tumor has been burned away. Such relapses not unfrequently appear during the first three months after the apparent destruction of the tumor, and therefore must be guarded against by a confirmatory cystoscopy at this interval.

But if this confirmatory cystoscopy shows the site of the tumor to be normal, the prospects of further relapses *at this point* are extremely small. I have seen none; Beer has seen none; and in the large number of cases reported to Gardner as the result of his questionaire, only one such relapse *in situ* is recorded (this, by Gardner, himself), a recurrence after an interval of three years.

Thus among my 27 cases I have seen only one recurrence *elsewhere in the bladder* after a long interval of health.

CASE 5. Male, age 52, showed one tumor near the right ureter orifice, from which he had been bleeding intermittently for two months. This was destroyed by two burns. The cure was verified a year later, but 20 months after that (almost 3 years after the destruction of the first tumor) a new small papilloma was seen and burned off at a different point on the bladder-wall. This tumor had not yet given any symptoms. The patient has not been seen since.

But even today we are in no position to estimate with any degree of accuracy the probability of recurrence of bladder tumors.

Only one gentleman with whom I have communicated has expressed the conviction that such relapses are very common. He reports twenty-five cases, of which three are supposed cures, though but one has been verified after one year by cystoscopy. The remaining twenty-two have all recurred "within six months to three years after the last treatment." He states that "the recurrences have almost invariably been on sites remote from the primary outgrowth," and adds his conviction that after any operation "short of total cystectomy a recurrence will be observed in 90 per cent of all cases within a period of six years."

Careful confirmatory cystoscopy three months after apparent cure would, I believe, modify this gentleman's views by disclosing the wee tufts of villi whose later growth he characterizes as relapse.

PERSISTENCE OF CURE

Out of 27 personal cases, one eloped; 5 have relapsed for varying periods of time (1 to 3 years), of whom only one has not yet been controlled; two (Cases 1 and 2) have been operated upon; nine were apparently cured, but the cure has not been verified by cystoscopy a year later. Ten cases have, however, been so verified: six after one year or more, three after two years, one after five and a half years.

Adding to these cases those that have been kindly communicated by nine other surgeons, I am able to report 126 cases. Of these 25 have been cystoscopically proved free from disease at the end of one year; 26 more at the end of two years, and 14 at the end of three years or more.

CONCLUSIONS

1. Tumors of the bladder must be classified as benign or malignant in accordance with their clinical characteristics, especially their reaction to the desiccation treatment.

2. The clinical characteristics of malignancy are hardness of the tumor, intractable cystitis, and sloughing or ulceration of the tumor.

3. Multiplicity and size of tumor militate against the success of any form of treatment. The surgeon will have to decide from his own experience which cases are to be selected for desiccation, and which submitted to operation and desiccation afterward.

4. When a bladder contains more than two or three tumors we may prophesy a continual tendency to relapse, and we must insist upon the closest vigilance after apparent cure.

5. For two weeks after each treatment the patient should be within call of a physician qualified to care for either infection or hæmorrhage.

6. Cures should be verified, as follows: Cystoscopy must show the bladder entirely healed. Three months later cystoscopy must be repeated. One year after this it must be repeated again. Further cystoscopic verification must be made at periods of about three years. For how long the tendency to relapse continues, we do not know; but after the first year it is probably slight.

7. Death has resulted once from hæmorrhage and twice from "pericystitis."

RADIUM VERSUS SURGERY IN THE TREATMENT OF VESICAL NEOPLASMS

By J. BENTLEY SQUIER, M.D., F.A.C.S., New York

ALTHOUGH the yearly production of radium element for the entire world is at the present time about one-third of an ounce, the vast amount of investigation concerning its therapeutic value which is being carried on may be appreciated from the fact that since 1901 over twenty-five hundred monographs and papers have appeared upon its various actions and possible uses.

Surprising it is, therefore, that even though ten years have elapsed since the application of radium to the treatment of malignant tumors, certain fundamental information concerning its therapeutic capacity is still lacking. One explanation of this seems obvious; namely, that our knowledge of the real cure of cancer will depend upon our knowledge of the real cause of cancer, and the finality of one will absolutely depend upon the accuracy of the other.

Let us suppose, for the sake of argument, that radium acts as a pure cautery, but with the added possibility of destroying cancer-cells without giving injury to normal tissue; and also let us accept for the moment the discovery of filterable viruses producing different types of sarcoma as a proof of the parasitic hypothesis of the cause of tumor formation. Or, let us take a less radical view and consider that the agent which produces malignancy in a normal cell is a biochemical one, acting from without the cell. How then can we hope that any agent that causes merely cell destruction is the long-looked-for cure for cancer?

If it is proved true, as many investigators now believe, that the so-called "precancerous stage" may be of a constitutional nature and not simply locally predisposing, we would have to give up any form of surgery as being the ideal therapeutic measure in dealing with malignancies, and we would have to consider excision of the cancer as futile of result as excision of the primary lesion has proved to be in the cure of lues. However, until the laboratory gives us more definite data from which to deduce conclusions, we will have to consider that local removal or destruction of cancer is the only justifiable method of treatment, and we will push ahead in this belief.

In a general way we might sum up our present knowledge concerning the therapeutic value of radium in the treatment of cancer about as follows:

It is not at present known what quantity of radium must be applied to kill a cell of a cancer within a given distance. It is perfectly certain that in the benign epitheliomata of the face, including many types of basal-cell epitheliomata, radium is capable of inducing a cure, since there are already a sufficient number of observations on human beings to enable us to make so positive a statement. We do know that radium will not cure a carcinoma or sarcoma at a distance of, say, three or four inches from the tube. This has been shown by the work of Krönig and Gauss and Bumm in Germany, who have published a series of cases of carcinoma of the uterus which have shown recurrence at a considerable distance from the site of the radium application, even though the primary carcinoma in the uterus had been completely destroyed. As far as one can now judge it is useless to expect any effect from the quantities of radium now available at a greater depth than about two inches from the tube. Within this distance it is often possible to influence tumor growth, but the quantity of radium required is so large that but few have the necessary amount. By large quantities is meant four or five hundred milligrams, which at the present market price is worth sixty to seventy thousand dollars. The application of these large quantities, however the radium may be protected or screened, frequently results in serious burns of surrounding tissue which do not heal for a long time. Therefore extreme caution in application is necessary when applying radium to vesical tumors.

It is well known that many of the bladder papillomata are benign or at least not extremely malignant. If such growths can be approached either from the urethra or through a suprapubic incision and the radium placed in contact with the base in quantities of 200 mg. and for an exposure of twenty-four to forty-eight hours, there is no question but that a good deal of effect may be secured within a radius of two to three inches from the site of application. The danger of deep ulceration with the production of rectovesical fistulæ or fibrosis must, however, always be kept in mind and guarded against.

In the malignant tumors of the prostate, involvement of the rectum or at least close approach to the rectal wall is not infrequently noted. In such case the greatest care must be taken not to radiate too long, and the tube should be buried in the body of the tumor so as to get the full effect of all the rays in all directions. Merely laying the tube in the bladder over the surface of the growth cannot be expected to do much good. The final results of the application of radium to the bladder and prostate tumors cannot at present be estimated from the clinical side, for the reason that the number of cases thus reported is small, and of these many have not been studied microscopically and therefore must be excluded, and most of the reports have been made before a sufficient time has elapsed to make it possible to judge whether the cure is permanent. Certainly, with our knowledge of the slowness of the growth of certain prostatic tumors, some of which do not recur extensively in less than one or two years, it is the height of folly to report a cure at the end of two months. We must rather wait patiently for at least three years before even considering that the results may be permanent.

It is wiser then not to consider radium as the primary therapeutic choice in the treatment of vesical tumors where operation is possible. If the operation has been necessarily incomplete, it may be wise to radiumize the field thoroughly with large quantities of radium in order to destroy cancer-cells which may have been distributed throughout the field of operation and those which have remained beyond it. When a tumor has recurred after operation the use of large quantities of radium may check the course of the growth for a certain length of time, but the use of small quantities is to be deprecated, for stimulation with increased rapidity of the growth of the tumor may result from the application of an insufficient quantity.

My experience with the use of radium has been limited to a number of cases of extensive vesical carcinoma, and personal observation of the work of Dr. Francis Carter Wood, Director of the Crocker Cancer Laboratories of Columbia University, in experimenting with radium in mice tumors.

The vesical carcinomata cases were those who had previously been subjected to operation for the removal of the growth. In each instance, the incompleteness of the surgical removal was recognized at the time of operation and the patient at once given the benefit of the application of radium to the unremoved tumor. The technique was the same in each case: Eighty to 100 mg. of radium element screened with 1 mm. lead, 2 mm. paper, and a thin sheet of rubber were applied to the tumor through a large suprapubic tube. This was left *in situ* for varying periods of time; the shortest period being six hours, the longest period being thirty-six hours. The number of applications was usually three. The immediate results were similar in all cases; a checking of hæmorrhage, an inhibition of bacteriuria with markedly diminished pus in the urine, and, strange as it may seem, a feeling of well-being expressed by the individual. In all the patients, the suprapubic wounds healed quickly. Each patient died of an extension of the growth within six months of the operation. In no case was there a return of vesical hæmaturia, the extension being into the pelvis or peritoneal cavity. The number of cases treated was four.

Appreciating that these cases are not at all conclusive and that they add but little to the scientific data concerning the therapeutic value of radium, it may be of interest to include in these remarks some of the data derived from animal experimentation carried out by Dr. Wood.

The experiments comprise quantitative studies of the lethal effect of radium on tumor-cells. They are undertaken because of the paucity of information attainable from the writings of various experimenters, working both with human and with animal tumors, on the quantities of radium used, the screens employed, and the time of exposures. These factors being the only ones which would furnish a scientific basis for computing the efficiency of radio-active substances, experiments were carried out with the idea of solving some of the above-mentioned problems.

Rat and mouse tumors of various types were used. These were treated *in vitro* and *in vivo*. Following an exposure of the B- and Γ-rays in different amounts and for varying periods of time, portions of the treated tumors and untreated controls were inoculated into animals of the same strain. The A-rays were not employed, as they are soft rays, causing superficial burns.

The B-rays, composed of soft, medium, and hard rays, were found to be screened as follows: The absorption limit of the soft rays was 0.4 mm. brass. The medium and hard rays would penetrate such a screen for about 0.8 mm. To absorb the medium and hard B-rays 1.2 mm. of brass was required.

The Γ-rays are the most penetrating. They passed through 1.2 mm. brass. Upon striking the metal used to remove the B-rays, the Γ-rays produce a soft secondary B-ray of very slight penetration. These are blocked by a screen of filter paper 5 mm. in thickness.

Filtering out the B-rays greatly increased the time required to produce a lethal effect. After a long series of experiments it was found that exposures of seven hours to 100 mg. of radium were necessary to kill the tumor-cells with the B-rays filtered out.

From a series of inoculation experiments on a previously radiated tumor, it was shown that from as large a quantity of radium as 83 mg. of the element with an exposure of two hours the tissue was not affected at a distance of 1 cm., the inoculated-radiated tumor growing as rapidly as the unradiated controls.

Wood calls attention to the action being governed by the law of inverse squares. "If the distance of the tube from the proximal portion of the tumor is 2 mm., and from the distal portion 12 mm., then the effect is not as 1 to 6 but as 4 to 144 or as 1 to 36." His experiments seemed to prove that in radiated tumors the slowness of growth after inoculation was probably due to injury of the mechanism of mitotic division of the cells. Wood's conclusions are:

1. "Three factors only are dominant in the action of radium on tumors; i.e., the time of exposure, the amount of radium element, and the distance between the tube and the tissue to be acted upon.

2. "The removal of suitable filters or the greater part of the B-rays diminishes proportionately the lethal effect of the radium, but that this Γ-ray effect follows the same law as that governing the B-rays.

3. "Sublethal exposures slow the growth of tumor-cells for some time, while a still shorter treatment seems to stimulate the cellular growth activities."

Therefore, in the light of our present knowledge, we believe that cures in bladder tumors by the use of radium may be hoped for only in benign papillomata; that it may be possible in certain instances to render the symptoms of vesical malignancy less distressing by intra-urethral, suprapubic, rectal, or cross-fire intra-urethral and rectal radiations; that by the time vesical carcinoma has been made clinically manifest the growth has already extended too far to be readily influenced by the amounts of radium at present at our command; that the question of the best management of a case of vesical carcinoma is no different than the management of carcinoma anywhere else in the body — and such is, if the growth is anatomically accessible, wide surgical extirpation followed by every means known of science to treat any unremoved growth or recurrence.

We may find, however, as further experience develops more ingenious means to use radium intravesically, that radiating the tumor before operation may lessen the danger of tumor transplants occurring at the time of operation.

THE PATHOLOGICAL DIAGNOSIS OF TUMORS OF THE BLADDER WITH PARTICULAR REFERENCE TO PAPILLOMA AND CARCINOMA

A Study of One Hundred Thirteen Neoplasms[1]

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ALTHOUGH much has been written about the difficulty of differentiating with certainty between carcinoma and papilloma of the bladder, very few, if any, systematic and comprehensive pathological investigations have been made from both the histological and clinical viewpoints with correlation of the findings. It is generally believed that such differentiation is often impossible and that neither the cystoscope nor the pathologist can give definite and reliable opinions. From a study of one hundred thirteen tumors of the bladder that have come under our observation at the Pathological Laboratory of the Mount Sinai Hospital during the past ten years, and from a study of many other vesical tumors (more than twenty-five in number), where the material, however, was not sufficient to be included in the series, we have come to the conclusion *that the pathological diagnosis of carcinoma is possible in most cases.* Through the kindness of Dr. F. S. Mandlebaum, Director of the Pathological Laboratory of the Mount Sinai Hospital, a large part of this material was put at our disposal; the rest was collected from cases in our own practice.

The opinion that pathological diagnosis is not reliable has been widely accepted. On critical study it becomes evident that credence in this view has become established by the support of some correct assumptions, but depends also upon many fallacious conceptions. We could summarize the various pathological and clinical notions that have led to the erroneous belief that diagnosis on a pathologic basis is not reliable, as follows: First, papilloma recurs in the bladder interior in a larger percentage of the cases; second, papillomata may diffusely involve the whole bladder, producing a condition of papillomatosis with a malignant clinical course; third, papilloma is often indistinguishable from carcinoma with the cystoscope; fourth, papillomata may be present and grow over a carcinoma; fifth, it has been contended that it is impossible to obtain adequate material for histological studies by any cystoscopic or non-operative means; sixth, metastases may occur in the wound after suprapubic operation, even though the primary tumor was papilloma; seventh, the frequent association of single or multiple papillomata with a carcinoma in the bladder; eighth, papilloma has been regarded as indistinguishable from carcinoma with the microscope, and that if morphological criteria exist, they are not dependable; ninth, if carcinomatous changes occur in a papilloma, they take place in the so-called "depth" or in the "base" of the tumor, where they are inaccessible to our methods of examination.

If we analyze carefully all of these notions that could shake a belief that pathological differential diagnosis between carcinoma and papilloma is possible, we find that only the first three conceptions are true. All the others are fallacious.

When we first took up the question as to whether the possession or the acquisition of biological traits of malignancy is accompanied by demonstrable structural variations from the normal benign type in tumors of the bladder, we were inclined to be skeptical. As time went on, however, our concepts became completely changed, and the opposite conclusion has been reached; so that today we are willing to go on record as holding the belief that in most cases the acquisition of malignancy from the clinical standpoint goes hand in hand with the appearance of definite histological changes in the type of growth, and that these should be recognized by the expert pathologist.

[1] From the Department of Surgical Pathology, Mt. Sinai Hospital.

The recognition of carcinoma of the bladder on a pathological basis must depend upon the following: First, that morphological characteristics varying from the benign type *do occur* when a tumor either possesses or has acquired the clinical traits of malignancy; second, that material can be obtained in which certain morphological criteria indicative of malignancy can be demonstrated; and, third, that the examiner possesses the power to recognize these criteria when they do occur.

In the course of this paper it will be shown definitely that morphological changes do occur in most instances; in fact, in all the cases of carcinoma of the papillary variety with but one exception was this the case.

As regards the obtainment of material, methods for carrying this out have been suggested by the author in previous papers,[1] the use of the operating cystoscope having been recommended, together with the punch forceps, or the snare, in cases of papilloma.

In the elaboration of the theme the subject matter will be divided in the following way:

I. The morphological criteria upon which a diagnosis of papillary carcinoma can be made.

II. The circumstance that these criteria occur in portions of the tumor that are accessible to our diagnostic methods, since—

A. They are present *not* in the inaccessible "depth" of a tumor, but in the approachable parts of papillomata that have undergone malignant change, and since—

B. They are present throughout the neoplasm in the case of primary carcinoma.

III. The application of these criteria in the classification of my series of one hundred thirteen tumors, including a demonstration of their value in recognizing the true nature of those tumors that otherwise would be and have been incorrectly diagnosticated.

TYPICAL PAPILLOMA

For a thorough understanding of the histological criteria upon which a diagnosis of carcinoma may be based, it is necessary to have a definite knowledge regarding the normal limit of variations from what may be called the typical papilloma growth. The pathological anatomy of the true papilloma is so well known that I need hardly go into detail regarding it here. For an appreciation of the points to be brought out in this paper, the following structural characteristics alone need be pointed out:

Papillomata appear either as pedunculated growths or as sessile tumors. They vary considerably as to size. The pedunculated form, which is the most common, is distinguished by its pedicle. Its presence, however, is often overlooked, since by virtue of extensive arborescence it may be completely shrouded from the view of the cystoscopist. For this reason, many tumors are regarded as sessile when they really belong to the pedunculated type. If we look at a section of such a growth (Fig. 1),[2] we will note that the pedicle rises perpendicularly from the surface, and that it may grow into the bladder-lumen for a considerable distance before villi are given off. The submucous tissues hypertrophy considerably and the pedicle contains many new-formed vessels, some of large caliber but thin-walled, others smaller with thicker walls. A knowledge of the general architecture and microscopic structure of the pedicle is important for a correct conception of what "infiltration" of the so-called base of the growth with carcinoma may mean. In general, a thorough study of the pathology of these growths will reveal the fact that ablation of the tumor by means of a snare or other instruments would leave the bladder-wall perfectly intact except for a moderate-sized hiatus in the mucous membrane.

Similar conclusions can be arrived at when, after the use of the snare, the region of the base, root, or pedicle is extirpated with the cystoscopic punch forceps. A study of a number of specimens was made in this way. In some instances we found at the periphery of the pedicle a tendency of the mucous membrane to proliferate, attended with some

[1] Buerger. Tr. Am. Urol. Ass., April, 1913.
A clinical study of the application of improved intravesical operative methods in diagnosis and therapy, Med. Rec., 1913, June 21. Zur Klinik der Operations — Cystoskopie, Ztschr. f. urol. Chir., 1913, I, No. 5. Concerning certain problems in urethrovesical diagnosis and treatment (with description of a new instrument), Am. J. Surg., 1915, February.

[2] I am indebted to Dr. F. S. Mandlebaum, Director of the Pathological Laboratory, Mt. Sinai Hospital, for the preparation of the photomicrographs reproduced here.

inflammation of the submucosa, or with the production of minute villi in the surrounding mucous membrane. But as a rule, if marked inflammation is absent, there is little of that intense proliferation of the epithelial elements, and little of that œdema which is so characteristic of the infiltrating carcinomata.

An investigation of the base of the papillomata during life, that is, by means of the operating cystoscope, shows that we can remove by means of the punch forceps practically everything that is left of a papilloma after the use of a snare.

Sessile papilloma. It is essential to have an exact idea of the histology of these growths in order to explain the possibility of certain types of infiltrating carcinoma that may develop in them and to appreciate the difficulty of a thorough removal of this type of growth.

A reference to Fig. 2 will show the general conformation of this type of growth and the relation of its epithelium to the surrounding mucous membrane.

The histology of papillomata. Regarding the villi, we may group these into two types: the massive villi with many layers of cells, and the slender villi that vary only as to length. The massive type has a tendency to fuse, so that enormous nests of cells are produced. To the inexperienced eye, these may give the impression of solid carcinoma, particularly when the section is made perpendicularly to the long axis of the papillæ.

Certain of the atypical appearances noted in papillomata are not to be regarded as indicative of malignancy. Some of these are degenerative, others metaplastic. There may be, first, the formation of glands or cysts, the conversion of the epithelium into cylindrical and cuboidal epithelium with the acquisition of the property of secretion; second, intense inflammatory invasion with round cells, infiltration of the epithelium with fine fusiform cells, probably angioblasts; third, conversion of some of the cells into squamous cells, such as are within the normal type of cell.

There are certain other changes that must be differentiated from those which we regard as evidences of malignancy. These are a slight variation in the size of the nucleus — nuclei larger than normal — and a tendency for the basal cells to vary from the normal. In places, cells similar to the fusiform malignant variety are encountered. On the whole, however, none of these changes are sufficient to the experienced eye for a diagnosis of variation from the normal, nor are they to be regarded as suggestive of malignancy.

In the sessile papillomata there is marked proliferation of epithelial cells in a fashion similar to that observed in the case of certain flat papillomata or condylomata of the integument. The margin of these growths was studied in a number of specimens. In small tumors of this variety we often find that the epithelial proliferation is nothing more than an exaggeration of the von Brun-Limbeck's nests, and we must regard some of the neoplasms as originating from these formations.

If we study the epithelium in the neighborhood of such growths, we will often see papilloma formation in its earliest stages. Thus we may see single tufts or solitary excrescences which present rather long, finger-like growths of connective tissue surrounded by epithelium. The submucous tissues under these flat tumors often show evidences of infiltration with round cells, but not any more extensively than the surrounding epithelium.

Recurrences in papilloma. It is a well-known fact that recurrences take place after the removal of papillomata, whether the high-frequency method be employed or whether a surgical operation be done. It is also known that papillomata may occur elsewhere in the bladder after the removal of the primary growth. Our own observations have shown that carcinoma and papilloma may exist in the bladder at the same time, and that after a primary papilloma there may be a recurrence of the papilloma in one part of the bladder and a growth of carcinoma in another. We have further been able to demonstrate that papillomata may develop in other parts of the bladder even after carcinoma has made its appearance. This is important in diagnosis, because the mere fact that a diagnosis of papilloma is made on a section removed from the bladder does not mean that carcinoma is absent. We must remember that a carcinoma and a papilloma may both

be present at the same time. That this is true, not only autopsy specimens, but also clinical findings and microscopic studies, have shown us. It is necessary, then, to obtain material from the carcinomatous growth itself for pathological diagnosis.

Our studies have brought us to certain conclusions as to the possible course of recurrences of papilloma. There are several possibilities: Papilloma may recur as papilloma; papilloma may be followed by a condition of papillomatosis; papilloma may be followed by primary carcinoma, by a papilloma which has become converted into a carcinoma, or by multiple papillomata, one or more of which may become carcinomatous.

We believe that the recurrence of papilloma, as such, cannot be regarded as indicating that the primary growth was malignant, nor that the new tumor is necessarily of that nature. All our clinical, as well as pathological, data point to the benign nature of this type of growth. Although it has been found in the case of carcinomatous change of papillomata that certain cell variations are characteristic, a very careful investigation of those cases of papilloma which recur as papilloma fails to reveal any such cellular anomalies. At any time, however, as will be shown further on, either a primary papilloma or its recurrence may acquire malignant properties, the objective manifestations of which can be visualized with the microscope. Certain it is that in many of our cases recurrences were shown both clinically and pathologically to have acquired malignant properties either as primary carcinomata or papillomata that had undergone carcinomatous change.

I. The Possibility of Pathological Diagnosis

What are the morphological criteria upon which a diagnosis of papillary carcinoma can be made? In discussing this theme we will point out what are the histological criteria upon which a pathological diagnosis of carcinoma can be made; will show that these were present in all of our cases of malignancy; will demonstrate by a study of those papillomata that have undergone early change where these alterations occur, namely, in accessible portions of the tumor; and, finally, will review the diagnosis of all of the various types, with a view to demonstrating how a diagnosis should be made in each instance.

It was only after a very thorough pathological investigation of papillomata and carcinomata that the conviction was forced upon us that certain peculiar abnormalities in the conformation of the cells regularly mean either the presence of primary carcinoma or carcinomatous change in a papilloma. These abnormalities are: cells manifesting irregularities in size and shape; nuclei rich in chromatin, deeply-staining and of bizarre shape; cells with atypical mitoses; giant cells and multinucleated cells. All these, when occurring in papilloma of the bladder, indicate the presence or beginning of carcinomatous change. It will be granted that certain variations in the type cell belong to the benign growths, and that the proper estimation of such changes depends to a great extent upon personal interpretation. It is true that in such matters as these no hard and fast rules can be laid down, and we can only in a general way indicate from personal observation what types of variations from the normal can be regarded as indicating malignancy. In the case of other organs, such as the thyroid, the liver, etc., atypical cells *per se* cannot be regarded as evidences of malignancy. In the bladder, however, our experience has led us to conclude that, whenever such cells are present, a very thorough search through the tumor will often disclose other distinct evidences of malignancy. Another and most reliable evidence of carcinomatous change will be found in a disturbed relationship of the cells to each other, in a loss of the typical palisade arrangement of the cells, in the presence of long fusiform or compressed types of cells, in the existence of evidences of infiltration of the stroma and penetration of the basal membrane, in the presence of cells in the capillaries, and, finally, in the occurrence of epithelial cells in the submucosa or muscular coats of the vesical wall.

These criteria have enabled us to recognize the presence of a malignant tumor in seven-

Fig. 1.

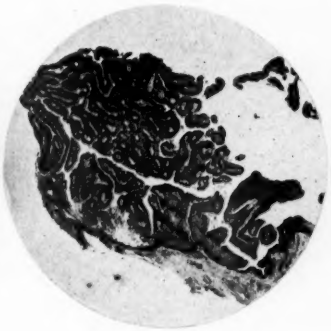

Fig. 2.

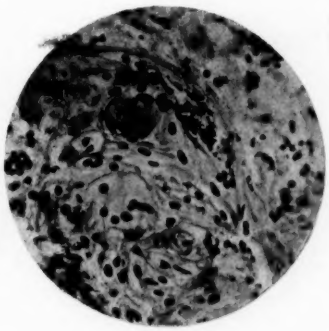

Fig. 3.

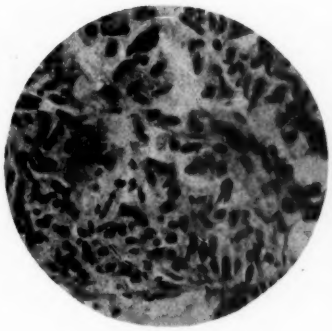

Fig. 4.

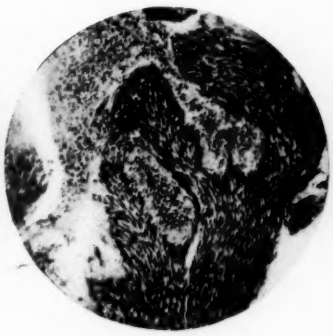

Fig. 5.

Fig. 6.

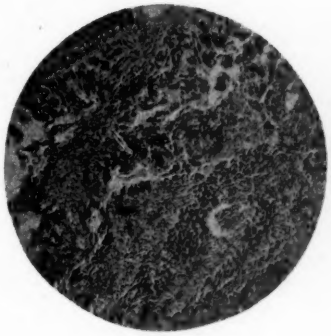

Fig. 7.

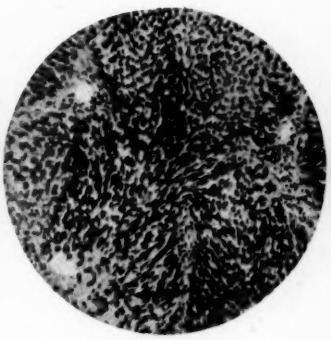

Fig. 8.

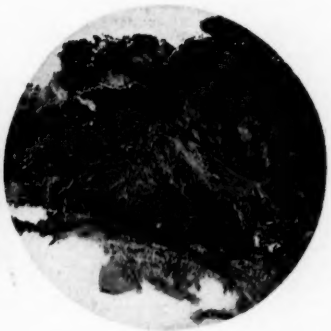

Fig. 9.

Fig. 1. Typical papilloma.

Fig. 2. Sessile papilloma.

Fig. 3. Atypical multinucleated squamous cells indicating carcinomatous source.

Fig. 4. Atypical nuclei and cells, papillary carcinoma.

Fig. 5. Atypical fusiform cells adhering to high-frequency electrode — from same case as Fig. 4.

Fig. 6. Same source as Figs. 4 and 5; small celled papillary carcinoma, proof of reliability of morphological criteria.

Fig. 7. Above, cells of bizarre shape, etc.; below and to the right, muscle infiltrated with papillary carcinoma.

Fig. 8. Atypical cells (fusiform type) in small amount of material (Case 4).

Fig. 9. Section through tumor and bladder-wall (Case 4); on surface, phosphatic encrustation; below, diffuse infiltration of wall with papillary carcinoma down to peritoneum.

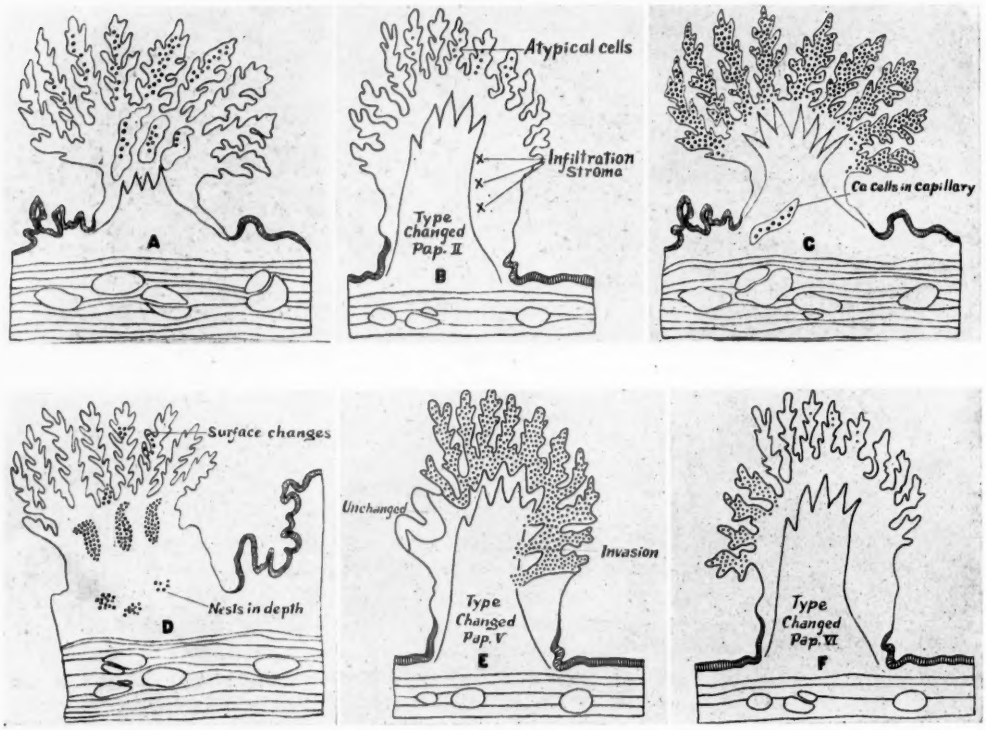

Fig. 12. *a* to *f*, Schematic drawing of types of "changed papillomata." Heavy dots indicate changes in cells. *a*, Type I, atypical changes in villi both near surface and near to pedicle. *b*, Type II, atypical cells in villi (accessible); infiltration of stroma near base of villi or between villi (accessible). *c*, Type III, extensive surface changes; carcinoma cells in a capillary in pedicle, showing that although superficial material gives us diagnosis, macroscopic appearances give no clue as to condition of pedicle. *d*, Type IV, association of surface changes with changes in deeper layers of villi and in submucosa. *e*, Type V, extensive surface change; only small focus of papilloma unchanged; here and there, invasion of pedicle. *f*, Type VI, carcinomatous change beginning in the peripheral portions of the papilloma; elsewhere, there is occasional evidence of change.

teen cases where the material would have led to an incorrect or a doubtful diagnosis, if our present standards were rejected. If we accept these criteria, we shall also be able to diagnosticate malignancy from a relatively small amount of material, and the report "insufficient for diagnosis," such as is often made by the pathologist, will be less frequently given.

To illustrate: Fig. 3 is taken from bladder washings in a case of a clinically doubtful tumor of the bladder. A study of this slide reveals many atypical squamous cells, cells with atypical, lobulated nuclei, atypical mitoses, etc.; in short, cells that may be regarded as emanating from a carcinoma. A subsequent section from additional material proved the case to be one of squamous-celled carcinoma.

Another instance in which the value of the cellular changes and abnormalities in diagnosis is well demonstrated is Case 18 (M. B.). Here the first specimen remained undiagnosticated (August 14, 1911, and August 26, 1911). On thorough examination of this specimen (Fig. 4) we find the atypical cells, the fusiform cells, deeply-staining cells; in short, sufficient evidence to warrant the diagnosis of carcinoma. Figure 5, taken from material obtained during treatment with the

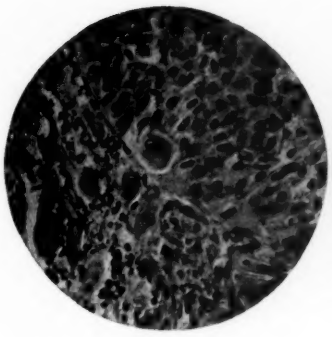

Fig. 10.

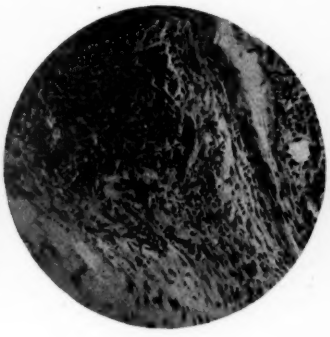

Fig. 11.

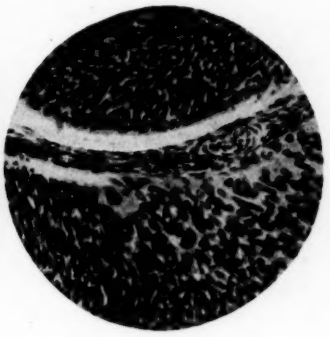

Fig. 13.

Fig. 10. Changed papilloma; above and to the right, atypical cells in base of villus; center and left, squamous type of carcinoma cell invading stroma and penetrating villus (Case 22).

Fig. 11. From tumor easily mistaken grossly and microscopically for papilloma; on right, almost indistinguishable from papilloma; in center, cells invade stroma (Case 9).

Fig. 13. After Mandlebaum;[2] carcinomatous change in epithelium of villus (Case 52).

high-frequency current,[1] should also have been regarded as being carcinomatous, because of the atypical fusiform cells and the atypical nuclei. Subsequent material, as well as the autopsy specimen, shows that we were dealing with a papillary carcinoma. Figure 6 shows the papillary carcinoma with cells resembling the papilloma cells, but staining more deeply, more rich in chromatin, and diffusely invading the connective tissue and muscle.

We have observed many other such cases. In Case 14 (P. B.), where the fulguration material included atypical cells, but was not considered ample for diagnosis, subsequent material showed (Fig. 7) not only the atypical cells, but papillary carcinoma infiltrating the muscle.

In Case 4 (T. T.) the material excised from a papillomatous growth (Fig. 8) — revealing the atypical fusiform cells and the peculiarity of the arrangement of the cells — should have been sufficient for a recognition of the malignant nature of the tumor. Figure 9, a section of the tumor obtained later by resection, disclosed a diffusely infiltrating papillary carcinoma with phosphatic encrustations on its surface.

Still more suggestive is the combination of atypical cells in the papillomatous portion of the tumor and the infiltration of the stroma with cells that are distinctly carcinomatous. Such large cells are often of the squamous variety (Case 22), traceable to a metaplasia of the tumor, some portion of which has become carcinomatous (Fig. 10).

Concerning the other criteria that must be relied upon in diagnosis, we may mention infiltration of the connective-tissue stroma. This, it will be granted, is accepted by all pathologists as an indication of malignancy. But, in our experience, it is usually accompanied by the cellular changes above referred to. Thus, in Case 9 after very careful search, to which we were incited by the finding of atypical cells, we were successful in finding areas of infiltration (Fig. 11) and islands of cells in the stroma as further evidence of the malignant nature of this growth.

In short, as has already been pointed out by Zuckerkandl[2] (although his statements are not absolutely convincing because of the absence of definite case and pathological reports), the presence of certain atypical changes in the cells either without or associated with evidences of infiltration in the stroma, islands of cells in the stroma, cells in the capillaries, etc., all these must be regarded as expressions of carcinomatous change or of the presence of a primary carcinoma.

A study of fifty-two carcinomata, forty-five

[1] Refers to tissue adhering to the high-frequency electrode.

[2] Loc. cit. Thanks are due Dr. Mandlebaum for use of these photographs.

[3] Zuckerkandl. Verhandl. d. deutsch. Gesell. f. Urol., 1909.

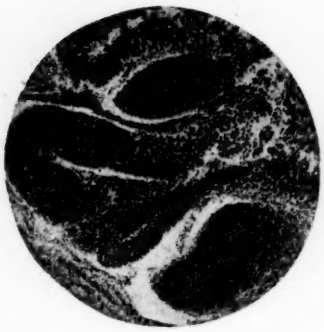

Fig. 14.

Fig. 14. Same, low power; below and to left, submucosa; in center, note area depicted in high power Fig. 13. Carcinomatous change in epithelium of surface, does not reach submucosa ("depth"). (After Mandlebaum.)

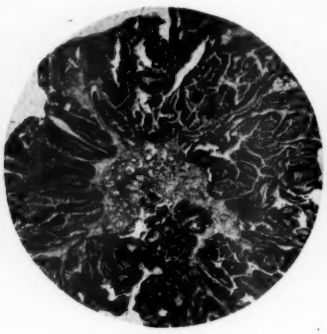

Fig. 15.

Fig. 15. Cross-section of changed papilloma (Case 43) with general structure of papilloma; contains atypical cells.

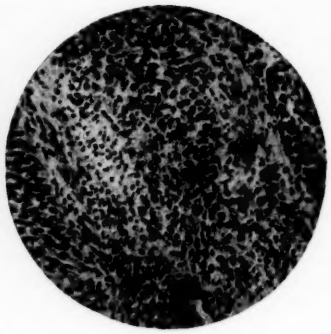

Fig. 16.

Fig. 16. Focus of Case 43 showing infiltration of stroma.

of which were papillary, five squamous, and two metastatic, demonstrated *that manifestations of structural variation from the normal papilloma type could be found in all but one case.* The peculiar nature of this one exception to the rule will be discussed later on; at the present moment it need merely be pointed out that one variety of malignant papilloma, "an infiltrating papilloma," need have none of the cellular earmarks of malignancy, at least as far as our material could disclose.

A review of material obtained between the years 1905 and 1914, inclusive, shows that in a number of instances of carcinoma the diagnosis would have to be regarded as doubtful, but on the basis of the criteria set down by us in 1915 *a correct diagnosis could be made in every instance.*

II. The Presence of Morphological Criteria

The morphological criteria are present in parts of the tumor that are accessible to our diagnostic methods, occurring in papillomata that have undergone early malignant change, and certainly also in the primary carcinomata.

A. Perhaps the most instructive variety of papillary carcinoma is that in which we have reason to believe a papilloma is undergoing malignant change. The question as to whether this occurs or not has been a mooted one for many years. Pathologists have expressed diametrically opposite views, although the weight of the opinion at the present time seems to favor the assumption that carcinomatous change does occur in papillomata. Sufficient clinical data have been adduced to support the view that such changes take place, and Mandlebaum[1] describes a specimen that seems to us to offer conclusive evidence of the possibility of such transformation.

Our own material has yielded us ample clinical and pathological corroboration of our view that a metamorphosis of papilloma into carcinoma does occur. Furthermore, we are of the belief that such a change takes place *very frequently* and could be demonstrated in at least thirteen out of our fifty-two cases of carcinoma; namely, 25 per cent. Some of the most instructive of our specimens are those obtained before the year 1910.[2] At that time almost all of the tumors of the bladder were at once subjected to suprapubic cystotomy and total excision, so that in these a thorough examination of the mode of origin of the carcinomatous change could be carefully investigated. From our specimens we

[1] Surg., Gynec. & Obst., 1907, v, 315.
Through the courtesy of Dr. Mandlebaum, Director of the Pathological Laboratory, Mt. Sinai Laboratory, photomicrographs of two of his specimens could be reproduced here. See Figs. 13 and 14.

[2] Since 1910 many cases have been treated with the high-frequency method, so that minute pieces derived from bladder washings or specimens excised through the cystoscope represented the only material sent to the laboratory in many instances.

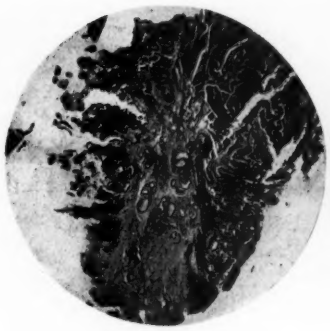

Fig. 17.

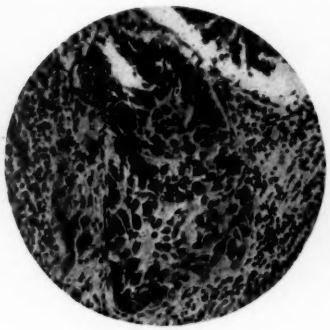

Fig. 18.

Fig. 19.

Fig. 17. General appearance of papilloma (Case 10, changed papilloma, Type II).

Fig. 18. High power of Case 10 showing, in center, invasion of stroma with atypical cells — carcinoma; above, unaltered papilloma cells.

Fig. 19. Changed papilloma, general structure of papilloma (Case 41).

were able to conclude, first, that carcinomatous change in a papilloma is possible and does occur rather frequently; second, that this change occurs in accessible portions of the tumor, that is, not in the "depth," as has been generally assumed to be the case, but anywhere in the surface or in the deeper parts of the villi; third, that in the early stages the villi alone may be involved; fourth, that villous changes may be accompanied by infiltration, by invasion of the deeper parts, or by metastases in the capillaries; fifth, that all stages in the transformation of a papilloma into carcinoma can be followed in the various specimens up to the point of complete transformation or even to the stage where an infiltrating carcinoma involves all the coats of the bladder-wall.

We have been able to group the various changed papillomata into six groups, depending upon whether, first, epithelial changes alone were present (Fig. 12a); second, where changes in the cells together with infiltration of the stroma coexist (Fig. 12b); third, where extensive cellular changes with invasion of the capillaries of the stroma could be found (Fig. 12c); fourth, where there are surface changes in cells, cellular changes in the stroma, and

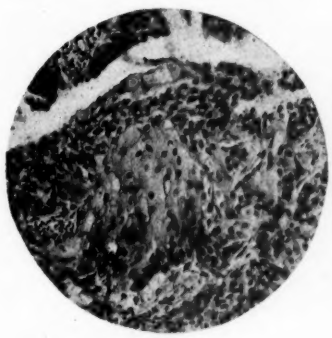

Fig. 20.

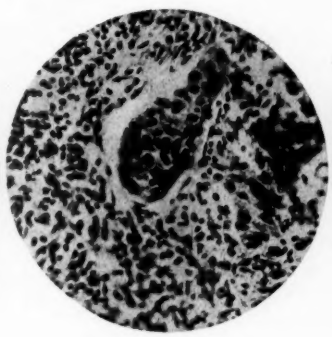

Fig. 21.

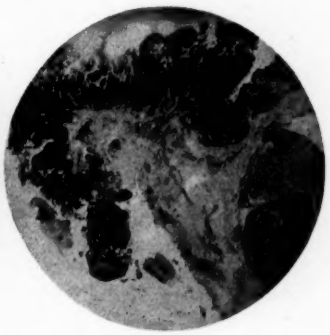

Fig. 22.

Fig. 20. Atypical changes in cells in same case (41); squamous metaplasia; taken from near surface; sufficient for diagnosis of carcinomatous change.

Fig. 21. Invasion of capillaries with carcinoma cells, same case (41).

Fig. 22. Changed papilloma (Case 46, Type V); above and to the right, mucous membrane; whole surface changed into carcinoma except for Island P, which is still unchanged papilloma.

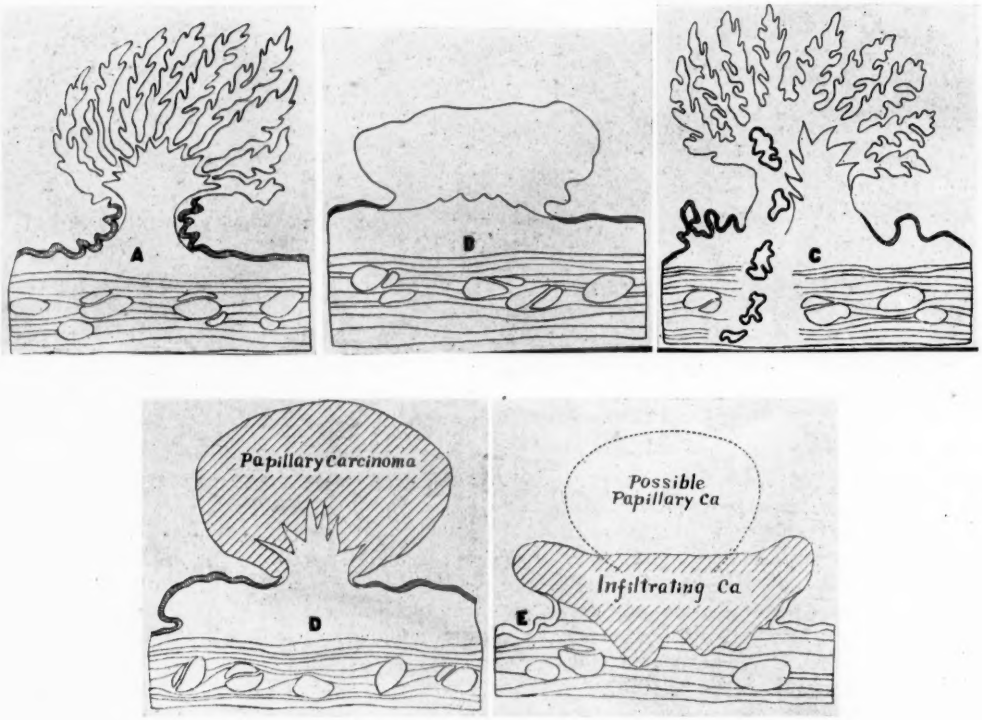

Fig. 24. *a*, Schematic drawing of a papilloma; *b*, schematic drawing of a sessile papilloma; *c*, schematic drawing of an infiltrating papilloma; *d*, schematic drawing of a papillary carcinoma; *e*, schematic drawing of an infiltrating carcinoma.

nests of cells in the pedicle (Fig. 12d); fifth, where extensive surface epithelial changes, slight foci of invasion into the pedicle, could be found (Fig. 12e); and finally, sixth, where there are surface changes with distinct carcinomatous change in the periphery of the growth, the pedicle and the stroma being intact (Fig. 12f).

These six groups must not be regarded as distinct varieties, for a change from one type into another may occur as growth progresses. The classification is to be accepted rather as a schematic grouping that may aid in elucidating the chief arguments contained in this paper.

In Case 52 (small growths removed by Dr. Ware July 20, 1906), we have a specimen with the general structure of a papilloma, but with the evidences of epithelial transformation and carcinomatous change in the deeper layers of the villi. There is extensive change near the surface of the growth extending downward for considerable distance, but always removed from the pedicle. Figure 13 shows the type of these changes in the villi. Figure 14 shows at 7 o'clock the distal portion of the pedicle in the center, the area of carcinomatous change shown in Fig. 13. Diagrammatically, this case is depicted in Fig. 12a.

A study of this particular case would lead us to conclude, first, that carcinomatous changes occur anywhere in the epithelium, certainly in portions accessible and far removed from the pedicle; second, that they may occur in several places at the same time; third, that portions excised through the operating cystoscope would have been adequate to make a positive diagnosis.

Illustrative of the second type, in which changes in the epithelial cells are associated

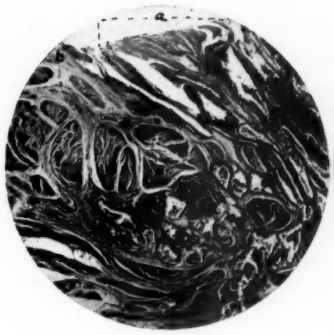

Fig. 23.

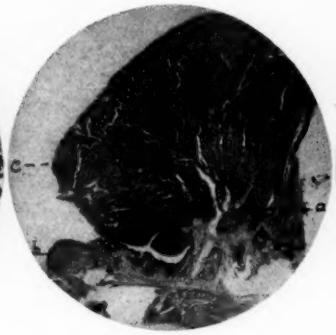

Fig. 25.

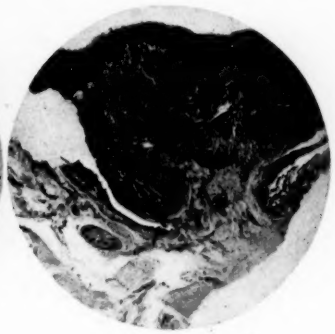

Fig. 26.

Fig. 23. Infiltrating papilloma; *a*, papilloma somewhat compressed owing to poor fixation of specimen; *b*, mucosa; *c*, muscle coat; *d*, islands growing through wall.

Fig. 25. Polypoid variety of papillary carcinoma (Case 39) macroscopically simulating papilloma; *a*, infiltrated pedicle; *b*, mucous membrane; *c*, any portion typically carcinoma.

Fig. 26. Polypoid (Type carcinoma I) carcinoma (Case 6) simulating papilloma.

with infiltration of the stroma, the pedicle being uninvolved, we have Case 43.

CASE 43 (J. B.). Here, too, the topography is that of a papilloma (Fig. 15), but many places are occupied by atypical cells. There is also deep invasion (Fig. 16). Here it is difficult to differentiate between a papilloma which has become changed into carcinoma in many places, or primary carcinoma of the papillary variety with rather typical structure. The general appearance of such tumors could be that of papilloma with very few lesions in the stroma, the changes being especially marked near the surface. The diagnosis could be easily made cystoscopically by the operating cystoscope, although the general topographic appearance would be misleading. The value of atypical cells, here too, will play an important rôle.

Another example of the variety of changed papilloma is Case 10. Here we also have a small tumor with the general conformation of a papilloma, with a pedicle and without any considerable invasion of the pedicle.

Material was obtained by complete excision of the tumor in a case in which a papilloma had been removed in the year 1906. Carcinomatous material obtained July 21, 1909, was, therefore, a recurrence. The general topography (Fig. 17) was that of papilloma with a distinct pedicle, but in the surface epithelium there were distinct evidences of atypical cells, deeply staining cells, large atypical nuclei, disordered grouping of the cells, the general arrangement being almost everywhere that of a papilloma. It is interesting to note that, in some places, no atypical cells are present, which points to the advisability of examining considerable material. After careful search, several places were found in which nests of cells had found their way into the stroma, and there were certain isolated cells and strands of cells of the squamous type in the connective tissue (Fig. 18). This again bears out the reliability of assuming that atypical cells mean malignancy.

Summary. A tumor resembling a papilloma, which even on high-power examination of a large part of it shows typical papilloma, but which, on more careful examination, discloses atypical cells and distinct places of infiltration. The diagnosis could have been made on the atypical cells. The proof that we are dealing here with a carcinoma is found in the fact that there are a number of places in which atypical carcinoma cells can be seen in the stroma. Some of these are of the squamous type. From this the conclusion can be drawn that sometimes squamous-celled carcinoma may arise in metamorphosed papilloma.

An example of the third type of changed papilloma is Case 11 (J. S.). Here we had a well-pedunculated tumor, with no macroscopic evidence of any tumor in the depth or in the stalk. However, there were markedly anomalous cells. In a number of places further evidence of the malignant nature of this growth was obtained in the presence of capillaries filled with atypical cells.

Summary. General topography of a papilloma; evidently carcinomatous change in a papilloma; the diagnosis corroborated by finding of invasion of the capillaries.

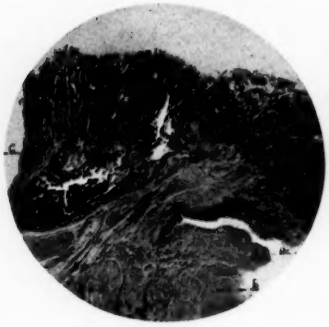

Fig. 27.

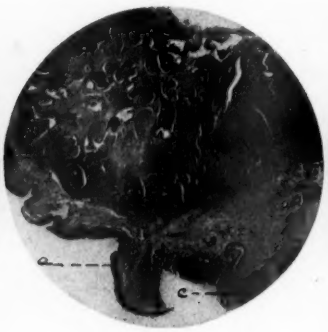

Fig. 28.

Fig. 29.

Fig. 27. Another portion of polypoid carcinoma (Case 6); exquisitely a mucosa and submucosa growth; *a*, mucous membrane; *b*, muscular coat; *c*, carcinoma.

Fig. 28. Infiltrating carcinoma (Type carcinoma II, Case 35); *a*, mucosa; *b*, carcinoma margin; *c*, muscular coat.

Fig. 29. Metastases of papillary carcinoma in mucosa of bladder.

Another interesting example of the third type of changed papilloma is Case 41 (G. L.). Here was an exquisitely papillomatous growth of small size in which the diagnosis could have been made from any portion of the surface of the growth.

Figure 19 shows that the general conformation of the growth is that of a papilloma. Microscopically there is no invasion of the deeper parts, the neoplasm being altogether a surface growth. In the surface of the growth there were carcinomatous villi that could be mistaken for the villi of a true papilloma if the cells are not carefully studied. Figure 20 illustrates the atypical changes in the cells, the squamous metamorphosis characteristic of carcinoma and rarely found so atypical in true papilloma. This is also taken from near the surface of the growth. Figure 21 exemplifies how the capillaries in the depth are invaded by the cells that have acquired carcinomatous character.

Summary. General appearance of papilloma; no macroscopic deep invasion, but undoubtedly carcinoma, as shown by the deep invasion microscopically, invasion of the blood stream, changes in the cells; in all probability a changed papilloma.

Another interesting case of changed papilloma and one which belongs to the fourth type is that presented by Case 2 (N. S.).

Here we also had a papillomatous growth. Although it had the general conformation of a papilloma and was mistaken for papilloma in the examination of certain specimens removed from the surface, our recent studies have shown that these very specimens contained sufficient evidence of malignancy to have warranted the diagnosis of carcinoma. There were enormous nuclei and an atypical arrangement of cells in the stroma, features which were overlooked at the examination made June 12, 1911. Autopsy confirmed the diagnosis of carcinoma, extensive infiltration having been found in the depth and capillaries invaded with atypical cells.

Summary. Tumor with the general topography of a papilloma; evidently carcinomatous degeneration of a papilloma. Atypical cells and infiltration of the stroma should have led to diagnosis of carcinoma.

An extremely interesting variety of changed papilloma is the fifth type.

CASE 46. Here we see practically the whole surface of a pedunculated growth converted into carcinoma, only a few islands of papilloma remaining, as depicted in Figs. 22 and 12e.

Illustrating the variety of changed papillomata (type VI), we have Case 48 (G. N., April, 1906), a growth in which but a small area of carcinoma could be found (Fig. 12f).

Here we have a very small surface papilloma without any apparent involvement of the muscularis, showing, near its periphery, the development of either a primary papillary carcinoma, or a change in the papilloma itself. Where we see atypical cells, we also find a corresponding infiltration of the deeper tissues.

In addition to the changed papillomata just described, we will give a brief account of the five others.

CASE 22 (L. S., April 24, 1912). Another case belonging to the second type of changed papil-

lomata. The preliminary diagnosis was incorrect, but on the criteria of 1915 the diagnosis could easily be made. Figure 10 shows not only the changed areas in the papillomatous portion of the tumor, but also the atypical cells, the infiltration of the stroma, and the villi with the squamous type of cells. From my studies of this case we would regard this as evidencing a carcinomatous change in a preëxisting papilloma. In the course of time a portion of this became metamorphosed into squamous type of carcinoma, with subsequent infiltration of the stroma and the villi.

CASE 7 (O. F., 1905, 1907, 1912), papillomatosis with change into carcinoma in the specimens removed in 1912.

CASE 13 (J. J., 1905, 1911, 1913, 1914). Case of papillomatosis with carcinomatous change in a papilloma and metastasis in the suprapubic scar, the original vesical tumor having been cured by operation (Dr. E. Beer).

CASE 27 (I. Z., 1913). Papilloma changed into papillary carcinoma, also infiltration with squamous type of cells.

CASE 34 (J. N., 1914). Typical carcinomatous change in a papilloma, reported as papillary carcinoma.

CRITIQUE OF THE EXISTENCE OF CHANGED PAPILLOMATA

Our thirteen instances of carcinomatous changes in a papilloma will be open to the criticism that we cannot in every case prove clinically that papilloma existed for a long time before carcinomatous change took place. In most of the instances the pathological data seem to us to be sufficient to assume that such a change had taken place, nor need we accept only such to be carcinomatous that recur after operation or metastasize; for, given a tumor in which early changes have taken place, and an extensive or thorough operation done, why need we expect a recurrence or other clinical manifestations of malignancy in every case? Do we expect such an issue in carcinoma of the breast or other regions? Certainly such proof is not at all necessary. As for the previous history, one case gave a history of papilloma growth for more than seven years (Case 7), another for over three years (Case 10), another case (Case 13) for over nine years. In these a previous diagnosis of papilloma had been made on a number of occasions. There are a sufficient number of cases reported in the literature where a tumor had been observed for even more than ten years by competent men, and then a change into carcinoma took place. Our own cases leave no doubt as to the occurrence of this metamorphosis.

PATHOLOGY AND CLINICAL COURSE IN CHANGED PAPILLOMA

Papillary Carcinomata

No.	Name	Pathology	Clinical Evidences
2	N. S.	Small tumor, infiltration	Autopsy confirmation.
7	O. F.	Papillomatosis, carcinoma	Clinical confirmation.
10	P. P.	Recurrence of papilloma	Not followed.
11	J. S.	Early carcinoma, infiltration	Operation.
13	J. J.	Papillomatosis	Metastases.
22	L. S.	Surely carcinoma	Operation — autopsy.
27	I. Z.	Surely carcinoma	Clinical course and autopsy.
34	T. Mc.	Carcinoma	?
43	J. B.	Carcinoma	Extirpation with prostatectomy.
44	D. M.	Doubtless carcinoma.	Operation, autopsy.
46	G. S.	Certainly carcinoma	Hard tumor at operation.
48	G. M.	Typical papillary carcinoma in periphery of sessile papilloma	Clinical confirmation.
52	L. E.	Surely carcinoma	?

Summary. Of 13 cases of changed papilloma 10 cases were confirmed by other data.

In short, although every one of the cases that we regard as manifesting a carcinomatous change in a papilloma could not be proved clinically malignant, a sufficient number (ten out of thirteen) were shown to be carcinoma either at operation or at autopsy to warrant the assumption that every one of the cases reported belongs to this group. A reference to the accompanying table will make clear that other data indicative of the carcinomatous nature of these changed papillomata could be adduced.

It may be urged that when a papilloma possessing all the changes described is present, and there is a carcinoma growing in the stroma, we must consider several possibilities: first, carcinoma developing from the papilloma; second, carcinoma developing from the bladder independently and secondarily invading the papilloma; and, third, carcinomatous metastases.

It is the first possibility that we have accepted in every one of our thirteen cases.

The question of the invasion of papilloma by a carcinoma developing independently could be ruled out in all the instances by a careful histological study. As for the possibility of metastasis, in the three cases of metastases that have been thoroughly investigated, we were dealing with a secondary growth from the prostate, or an adenocarcinoma from the sigmoid.

In fact, in our opinion the number of changed papillomata is in all probability much larger than that given here. In the laboratory we often get material from the deeper layers alone, the surface of the growth having become necrotic, having been possibly treated with the high-frequency method. Under such circumstances we can say nothing regarding the presence of a papilloma at some previous time, and the possibility of a changed papilloma cannot be ruled out. We believe that a larger number of changed papillomata into carcinoma exists than recorded here.

INFILTRATING PAPILLOMA

There is a type of malignant papilloma which occurred once in our one hundred thirteen specimens and which is the only one that could present marked difficulties in diagnosis. Characteristic of this type of growth (Fig. 23) is the fact that the general architecture is that of a papilloma, and that the cells may show no appreciable variation from the papilloma type. The tumor, nevertheless, infiltrates, the villi invading the submucosa and muscularis, even penetrating as far as the peritoneal coat.

CASE 29 (J. C.) presented two distinct papillomata 1 cm. in diameter near the sphincteric margin. In the posterior wall there was a sessile growth about 3 cm. in diameter. Both of the small tumors were histologically typical papilloma (Fig. 24a). The growth on the posterior wall was found on histological examination (Figs. 23 and 24c) to have penetrated all the coats of the bladder-wall.

Several questions arise as to the diagnosis in such a case. Can we diagnosticate this type of papillary carcinoma or malignant papillomata in which the cells do not vary appreciably from the papilloma type, which infiltrates and is, therefore, malignant? Perhaps this is the only variety in which cellular abnormalities could not be recognized. What are the features upon which a diagnosis could be made here, and how much material do we need? On looking over the specimens, we find that we do not have to go far to find large areas of muscle intervening between the epithelial islands. We need only enough material to show larger strands of muscle. Up to the present writing I have never been able to find larger areas of muscle between the villi of a true papilloma. If such are present, we can at once conclude that we are dealing with an infiltrating growth.

CARCINOMA OF THE BLADDER

B. Of our series of fifty-two carcinomata, forty-five may be regarded of the papillary variety, five squamous-celled, and two metastatic. There were at our disposal several other cases of carcinoma that could have been included in our list, but the material was not very large in amount, so they were discarded. There were several other cases of metastatic carcinoma secondary to primary growth in the prostate and one metastatic growth of the adenocarcinoma variety secondary to tumor of the sigmoid.

The enormous preponderance of the papillary variety of carcinoma is perhaps due to the fact that we have included under this type of cases all those tumors in which the cellular element and the disposition of the cells make it appear to us that they should be classed in this group. The following tables indicate how all the material may be subdivided:

BLADDER TUMORS

Papilloma		55
Carcinoma		52
(*a*) Papillary	45	
(*b*) Squamous	5	
(*c*) Metastatic	2	
Sarcoma		6
Total		113

PAPILLARY CARCINOMATA

	Classified	Total
Early changes in papilloma	13	1 = 14
Completely changed	2	2 = 4
Primary carcinoma	16	9 = 25
Infiltrating papilloma	1	= 1
Material inadequate	1	= 1
	33	12 45

Papillomatosis . . . . . 2 cases (included above)
Total . . . . . 52 carcinomata
Papillary carcinoma . . . . . 45 = 86 per cent

PAPILLARY CARCINOMA

These may be classified according to their gross characteristics or according to their histologic structure. For the pathologist who wishes to be able to express a reliable opinion upon the nature of these neoplasms it is essential to know not only the minute changes and appearances under the microscope, but also the general topography, so that he can properly interpret the relation that these tumors bear to papilloma. Macroscopically we distinguish two varieties: the papillary polypoid type with its exquisitely intrusive growth, and the infiltrating type.

It is the polypoid or intrusive variety of papillary carcinoma (Figs. 24d and 25) that is apt to be mistaken by the cystoscopist for papilloma. In our series, these growths were met with four times, although the second type or infiltrating variety may primarily have been carcinomata of this group.

The second or infiltrating type of papillary carcinoma is characterized by a more extensive surface growth, a total absence of stalk or pedicle infiltration of the mucosa, later of the muscularis and subserous coat, very frequently by an ulcerating surface and the deposit of phosphatic material on the surface (Fig. 24e). Twenty-five such carcinomata were found in our series, although it must be admitted that some of these may have originally belonged to Type I, the polypoid portion of the tumor having been either artificially destroyed or having become spontaneously necrotic.

The polypoid variety. The general appearance of some of these growths is that of a papilloma with a rather broad pedicle. Most of these are not diagnosticated by the cystoscopist, being mulberry-like growths of varying size.

One of the most interesting of these was Case 39; the general appearance of a typical papilloma, 2 cm. in diameter, overhanging a broad pedicle (Fig. 25). Surface shows the typical lobulations as in mulberry papillomata. The tissue is soft. Histologically the diagnosis of carcinoma was made on the presence of the atypical cells. The pedicle is free for the most part, except in a few places where it is beginning to be invaded.

The question arises as to whether this was primarily a carcinoma or not. One gets the impression that it may originally have been a papilloma. This patient was treated for some time by the fulguration method.

A sort of transition group is presented by those tumors which present polypoid growths in part, infiltrating in others. Some of these may also have originated in papillomata, although it is difficult to determine whether or not this is the case.

Case 6 was a case of large mushroom-like growth over an inch in diameter. In parts there were discrete polypoid masses of Type I variety (Fig. 26) having a distinct pedicle. For the most part, however, there was a fungiform growth, with overhanging margin, as seen in Fig. 27. Portions of this tumor could be interpreted by the inexperienced as papilloma. The deeper portions are distinctly alveolar carcinoma of the papillary variety. The bladder-wall is scarcely infiltrated.

Most of the tumors of the first type and of the type here which shows the combination of Type I and Type II, demonstrate conclusively that carcinomata, too, are for the most part surface growths and thus become accessible to our methods of biopsy. In diagnosis, the proper weight must be placed upon the cellular changes, to correctly interpret the tissue on the surface as belonging to carcinoma.

When we come to the second type of infiltrating growth, we may find little or no evidence of ingrowth into the muscle. Figure 28 shows the margin of such a growth, the mucous membrane being intact over a part of its periphery, the carcinoma having involved the mucosa and submucosa and passing down into the muscle.

Histological characteristics of papillary carcinoma. In order to be able to differentiate the carcinomata from the papillomata, we must first and foremost be acquainted with those finer changes to which we have elsewhere referred. For the beginner the recognition of a small area of carcinoma and the differentiation from papilloma is an extremely difficult matter.

Histologically, we may distinguish several types of papillary carcinomata: first, those in which cells remain small, resembling very closely the papilloma cells (Fig. 6); second, those in which the cells are of the large variety, considerable protoplasm and large nuclei; and, third, the papillary carcinomata in which the

transition into the squamous-cell type occurs. In this latter group there is evidently a metaplasia in the carcinoma itself, and we must not regard these as primary squamous-celled types of carcinoma.

The small cell type is seen in Fig. 6, where the resemblance to true papilloma is apparent. The richness of the chromatin and the tendency to infiltrate, at once stamp this as carcinoma. The small size of the cells is also often dependent upon the tissue in which they are growing, the cells infiltrating the muscle (Fig. 8) being of this type, while the surface growth presents many large forms. The large cell type is extremely common in the polypoid carcinomata, and is the easiest to recognize. This and the form with metaplasia into squamous-celled carcinoma cannot fail to be diagnosticated.

Local metastases in papillary carcinoma of the bladder. Two types of metastases have been noted in papillary carcinoma, and vary distinctly from the variety found in squamous-celled carcinoma. They may be classified either as the hard or soft variety. The former was observed in Case 38, where there was a large infiltrating tumor of the trigonal and paratrigonal regions, which was histologically papillary carcinoma.

In the paratrigonal regions there were two mushroom-like masses with a sharp overhanging border, apparently covered by intact mucous membrane, somewhat irregularly oval in shape. They seemed to be independent of the primary mass that occupied the trigonal region. In the vertex of the bladder there were numerous mushroom-like masses varying in size from a split pea to a large lima bean, one of these being 2.5 cm. x 1 cm. in diameter, with sharp margin apparently covered by intact mucous membrane and rising only some 2.5 mm. above the surface.

In short, characteristic of this type of metastasis is the presence of fungiform flat growths (Fig. 29) varying from the size of a split pea or smaller to a lima bean or larger, with overhanging margins, rather firm and consistent, made up histologically of carcinomatous tissue that lifts up the mucous membrane at the margin with a tendency to ulcerate over the surface.

The soft variety of bladder metastasis in papillary carcinoma resembles in every particular the polypoid carcinomata of Type I, except that they show a tendency to infiltrate the muscle very early in their development.

SQUAMOUS-CELLED CARCINOMA

Of the fifty-two carcinomata, five could be regarded as primary squamous-celled. This type must not be confounded with those papillary growths in which a metaplasia of the carcinoma takes place. These tumors are exquisitely of the infiltrating variety. Indeed, they penetrate so quickly through the muscular coat that they must be regarded as extremely dangerous to the patient. They may be likened to the carcinomata or so-called epitheliomata of the lip. The margin is sharp, hard, and gritty, so that when a piece is removed with the punch forceps we get the impression that we are getting a bite out of an apple or pear. The ease with which the jaws of the instrument cut through is in contrast to the sensation of elastic consistency afforded by other papillomatous tumors. It is due undoubtedly to the cornification and the peculiar chemical composition of the cells. The surface of these growths is usually ulcerating and covered with phosphatic deposit.

CASE 37 (S. P., 1914) was a typical growth of this variety, somewhat more than an inch in diameter. Characteristic further was the infiltration of the epithelium of the mucous membrane in the periphery for a considerable distance under the mucous membrane and the presence of numerous small metastases in the form of hard, lenticular infiltrations of the mucous membrane of the vicinity. A study of the mucous membrane in the immediate neighborhood of these growths will often show leucoplakia, the neoplasm doubtlessly originating in the metaplastic epithelium of the mucous membrane.

PAPILLOMA OVER A CARCINOMA

The appearance of papilloma apparently growing over a carcinoma of the bladder has been mentioned by certain authors who used this phenomenon as an argument against the possibility of making a diagnosis in some cases. Thus it is contended that, since a papilloma of considerable dimensions may proliferate over a carcinoma, the region of the true growth is not accessible to the cystoscopist. We have made a study of forty-five cases of papillary carcinoma with a view to investigating the truth of this argument. From our studies we can conclude that errors in diagnosis have probably been

made, and that when "papilloma" is said to occur over a carcinomatous growth it will show evidences of the carcinomatous changes seen in our own specimens. Some of our cases formerly thought to be papilloma on top of a carcinoma are now regarded by us as *carcinoma*, in view of the criteria that we have now accepted as establishing the diagnosis of malignancy. Some of these cases belong to a group of early carcinomatous change in papilloma, such as Case 18. Other cases that are reported as papilloma over carcinoma are often incorrectly diagnosticated, because of the fact that tissue (from another tumor — a papilloma elsewhere in the bladder) has been sent to a pathologist. For, it will be remembered, that one or more papillomata in different portions of the bladder can coexist with a carcinoma.

PAPILLOMATOSIS

A most interesting type of cases is that which we group under the name "papillomatosis." Clinically, these often have a malignant course. We have been able to obtain material from three such cases, only two of which I have included in the list. For many years we find repeated recurrences of papilloma, soon involving a large part of the vesical interior, and finally carcinomatous infiltration is demonstrated, either by the finding of an infiltrating bladder tumor or by the presence of a metastasis in the scar after suprapubic cystotomy.

From Case 7 we were able to obtain material on several occasions from October 3, 1905, to October 16, 1912. All the specimens previous to October, 1912, failed to reveal evidences of malignancy, but on October 16, 1912, histological examination shows atypical papilloma with atypical cells from which, according to the criteria we have accepted, a diagnosis of papillary carcinoma could be made.

Summary. Papillomatosis for many years, possibly more than five and as many as seven; finally carcinomatous change of one or more papillomata. Clinically the case was regarded as carcinoma in 1912, because of the presence of a large indurated mass that could be felt in the suprapubic region.

Conclusion. A papilloma may recur frequently as papilloma, but many years later may show a carcinomatous change. Even if a piece of tumor removed for pathological diagnosis is reported as papilloma in such a case, we are not justified in regarding this as final, because some of the tumors may be papilloma, and still one or more may have become changed into carcinoma. The histological diagnosis of papilloma in a case of multiple recurrences gives us no indication as to the severity of the clinical course. We have no means of determining in advance which cases are going to be cases of papillomatosis. When the diagnosis is made, we have before us the alternative of complete cystectomy or thorough curettage and cauterization of the bladder interior if no carcinomatous infiltration has as yet occurred.

In other cases, such as our Case 13, from which material was obtained from December 23, 1905, to October 5, 1914, the histological diagnosis was papilloma on a number of specimens. At any time, however, a carcinomatous change may occur, as was evidenced in the case, first, by the presence of a *metastasis* in the scar after suprapubic cystotomy, and, secondly, by the finding in some of the specimens of the usual changes in the cells that indicate malignancy.

The clinical course of such cases may be the following: multiple recurrences of papilloma which disappear after high-frequency treatment or Paquelinization; apparent cure of the bladder lesions after Paquelin cautery or high-frequency treatment, including even the destruction of superficial types of carcinoma: finally, metastases or local inoculation due to the implantation of fragments into the wound may develop.

In a third case material received nine years previously (1906) showed papilloma, and at the present time distinct evidences of malignancy in the recurrence, the clinical course in consonance with the pathological findings.

In short, cases of papillomatosis must be regarded as grave, for, sooner or later, carcinomatous change of one or more papillomata will be the outcome.

Concerning the previous existence of papilloma in cases of either primary carcinoma or changed papilloma. Careful review of all the cases of carcinoma shows that sixteen of these were undoubtedly preceded by papillomata, and that in three cases slight doubt exists, but all the evidence points rather in favor of the

previous presence of a benign growth, which would make a total of nineteen out of fifty-two tumors, or over 30 per cent. If we would exclude the three doubtful ones, we would still have a percentage of 30 per cent, or 30 to 36 per cent of the carcinomata preceded by papilloma. It seems to me that this percentage is too low in all probability, inasmuch as our data are not adequate to prove the previous existence of a papilloma in those cases where we are dealing with extensive growths, in those in which the diagnosis was made late, where the carcinoma has attained considerable size, and where the history is indefinite. Therefore we believe that at least 30 to 36 per cent in our series were preceded by papillomata, and possibly 40 to 50 per cent.

It is absolutely beyond our powers of diagnosis to foresee which of the papillomata will at some future time acquire malignant characteristics, which of the papillomata will recur, or which of the papillomata belong to that rare type of infiltrating variety that is in itself malignant. It has been shown that many papillomata never recur, and many remain permanently benign. It suffices, therefore, for us to discard all the papillomata from further investigation, inasmuch as it is quite impossible for us to learn anything more of their future biologic characteristics in any given patient. On the other hand, whenever either early changes of malignancy have occurred, or definite structural manifestations of carcinoma are present, we must be able to recognize these in order to intervene with proper surgical measures at once, early interference giving the only possible hope of cure for the patient.

The question arises as to whether sufficiently reliable morphological criteria can be recognized to distinguish the biologically malignant from the benign growth. Certain observations by a number of authors would tend to support the theory that a pathologic anatomical diagnosis is practically impossible.

If we pass in critical review the various statements according to which histological diagnosis was found unreliable, we would have for consideration in the main the following: First, a histologically benign papilloma was found to infiltrate and make metastases. Second, a histologically benign papilloma was found to metastasize in the scar after suprapubic operation. Third, a histologically benign papilloma was diagnosticated from a specimen in the bladder washings, and the clinical course as well as the corroborative findings at autopsy proved the growth to be malignant. Fourth, histological examination of papilloma consisting of small pieces removed from the bladder, extension into the prostatic region and perineal sinus, found to be carcinoma. Our own studies have shown, regarding the first statement, that whenever metastases developed it was regularly possible to find certain carcinomatous changes in the papilloma which had brought this about. It seems that the cases reported in the literature were not thoroughly examined, the carcinomatous changes overlooked, or possibly another tumor examined which was really papillomatous and of benign nature. We have been convinced of the fact that typical true papillomata do not metastasize.

As regards the metastasis of benign papilloma in the scar, this has been explained upon two true theories: first, that the tumor in the scar reported as carcinoma developed independently because of the long duration of the sinus (in which case it should be of a different type of carcinoma than is usually found in papillary tumors), or, second, that cells are loosened at a suprapubic operation and implanted into the scar. We have had occasion to examine very carefully many of those cases in the literature in which previous diagnoses had been papilloma, and carcinoma was found later in the suprapubic scar. On investigating slides from such a case, it was definitely ascertainable that some of the material gave distinct evidences of carcinomatous change. Doubtless such tissue gave rise to the "inoculation" growths.

That the material obtained from the bladder washings failed to show carcinoma is not convincing, because it is difficult for those who do not appreciate the finer evidences of early carcinomatous change to make a diagnosis from small specimens, and secondly, because the presence of several tumors cannot be ruled

out, the washings possibly emanating from other really benign growths.

As for the extension into the perineum, we have ourselves observed a case, and found, too, that a part of the primary tumor had become malignant.

We could suppose on purely theoretical ground that a tumor bearing all the histological appearances of being benign could metastasize and become malignant. If this were the case, we would be dealing with a problem impossible of solution. Fortunately from our studies this is only partly true of one type of tumor, the infiltrating type of papilloma.

III. Special Diagnosis

The various types of papilloma and carcinoma may be grouped as follows:

1. Papilloma.
2. Infiltrating papilloma.
3. Papillomata with early changes into carcinoma.
4. Primary papillary carcinoma.
   - *a*. Papillary polypoid type. Carcinoma Type I.
   - *b*. Secondarily infiltrating carcinoma. Carcinoma Type II.
5. Primary squamous-celled carcinoma.
6. Secondary carcinomata.
   - *a*. Infiltrating derived from papilloma.
   - *b*. Squamous type derived from papillary tumors.
   - *c*. Those derived from the prostate.
   - *d*. Metastases from source outside of the bladder.

1. *Papilloma.* Its characteristics have been sufficiently enumerated. It is necessary to obtain a large part of the growth for histological examination. This can almost always be accomplished *if the snare is used.* In order to be sure that the peripheral portions of the growth have not become carcinomatous, we must excise the mucous membrane of the periphery with the punch forceps. In the case of the sessile (Fig. 24b) type of growth, the snare is usually not applicable, and we must resort to many bites of the cystoscopic punch forceps or the Young rongeur.

2. *Infiltrating papilloma.* Here we are dealing with the most difficult problem in the diagnosis of papillary tumors of the bladder. The presence of larger areas of muscle between the islands of epithelium points to the existence of infiltration. The diagnosis of malignancy can be definitely made upon this point.

3. *Papillary tumors with beginning carcinomatous change.* In this group there are six different types according to our fifteen specimens. These are diagrammatically represented in Figs. 12a to 12f.

If these are reviewed, a striking fact comes to light: that the first and the most extensive carcinomatous change occurs near the surface, and not in the *depth*, as has been previously supposed, the tufts always showing evidences of malignancy. The villi are markedly affected in all. If in Type II we disregard the changes in the villi, we would have to find the places where the stroma is infiltrated, and even this has occurred distal to the pedicle. If in Type III we should not recognize the extensive carcinomatous changes in the villi, we would have difficulty in looking for capillaries or small islands in the depth. If we disregard the cell changes in Type IV, we would also have to seek in the depth for corroborative evidences. In Type V the same is true, except that the invasion is not so far from the surface, and in Type VI, if we disregard the surface changes, we would have to find that area of the periphery which has become typically altered.

In short, the diagnosis of papillary growths with early carcinomatous change depends not so much upon the acquisition of a large amount of material as upon our ability to detect and give the proper dignity to the early morphological alterations characteristic of carcinoma, for these changes do occur, as has been pointed out, in the tufts in all the six varieties. In only two out of the fourteen growths were evidences of infiltration or tumor growths in the bladder musculature or deep down in the pedicle. On the other hand, more common was the association of the atypical cells in the villi, together with infiltration of the stroma of the villi distal to the pedicle. This was presented in six cases; that is, cases in which the infiltration of the stroma could have been demonstrated in

specimens obtained by the punch forceps or snare, because changes were found on the tumor side of the pedicle. In three cases, only changes in the superficial portions of the tumor were found; that is, in portions of the tumor distal to the pedicle.

In short, we see that in practically all of these early papillary growths the diagnosis can be made if the criteria are accepted and if a reasonable amount of material is obtained for microscopic examination.

4. *Primary carcinoma.* In these we should find no difficulty in making a diagnosis, since any portion of the growth is absolutely characteristic. They present practically no difficulties to the experienced microscopist.

5. *Secondary carcinoma.* First, those arising from papillomata and infiltrating the wall of the bladder are easily recognizable on sufficient material; second, the squamous type, which has been changed from a papillary carcinoma, can be diagnosticated from a small number of cells; third, the secondary carcinomata from the prostate have small cells as a rule, or may be tubular carcinoma or adenocarcinoma, and the metastases may be of various types, depending upon their source. None of these should give the pathologist any difficulty in diagnosis.

In five of his cases Mandlebaum[1] was able to recognize that the vesical growth was secondary to a primary prostatic neoplasm, basing his diagnosis on the finding of a scirrhous or adenocarcinomatous type.

There remains for consideration the squamous type of carcinoma, which was represented in five cases. Cystoscopically these present a rather typical picture. These tumors are comparable to epitheliomata of the lip, and the structure under the microscope is similar.

[1] Loc. cit.

CONCLUSIONS

From a study of the pathology of one hundred thirteen tumors of the bladder, amongst which there were fifty-five papillomata, forty-five papillary carcinomata, five squamous carcinomata, two metastatic carcinomata, and six sarcomata, we were able to conclude that a differential diagnosis between papillomata and carcinomata can be made in almost all instances on a pathological basis.

Certain morphological criteria were accepted as indicating the existence or the acquisition of malignant traits in any given tumor. These criteria were found to be present in parts of the tumor that are accessible in so far as they can be reached by cystoscopic instruments, and in so far as adequate portions can be removed for histological examination. The changes that are indicative of malignancy occur, not as heretofore assumed, in the "depth," where they may escape our diagnostic methods, but manifest themselves, first, in the epithelium, not far from the surface, either with or without areas of infiltration.

A test of the morphological criteria proved conclusively that they are dependable and, if adopted, lead to correct diagnosis. Many of the other loosely accepted notions regarding the malignancy of papilloma *per se* were found to be fallacious. Only in one tumor out of one hundred thirteen was a papilloma found to infiltrate and still retain "normal" cellular characteristics.

In short, a reliable pathological diagnosis and the possibility of differentiating between carcinoma and papilloma depend upon our ability to obtain material and upon our ability to recognize the criteria laid down as indicative of malignancy, for that the latter are present our series of tumors has definitely shown.

INDICATIONS FOR SURGICAL INTERVENTION IN OBSTRUCTION AT THE NECK OF THE BLADDER

A SYMPOSIUM[1]

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STRICTURE OF THE DEEP URETHRA SIMULATING PROSTATIC OBSTRUCTION

BY JOHN H. CUNNINGHAM, JR., M.D., F.A.C.S., BOSTON

THE subject of prostatic obstruction is well established, and I think that any advances which we may make in the understanding of the various forms of obstruction at the vesical neck must come from a consideration of cases in which the symptoms may be those of an enlarged prostate and yet not due to this condition. In the perusal of my records of prostatic obstruction there is a small group of cases which stand out as errors in diagnosis, and it is of these cases that I desire to speak.

The case reports which follow are instances in which all the symptoms of prostatism were present and the physical examination corroborated the symptoms. In the instances here cited it was a perfectly natural mistake to make in view of the ages of the patients, their symptoms, and the findings. All of these patients were over fifty years of age, none gave a history of stricture, and in each instance the attending physician had made a diagnosis of prostatic obstruction from a rectal examination. I corroborated the diagnosis in each instance, but without employing all the methods of pre-operative study.

Aside from the details of the history which are essential, those of prostatism with obstruction, the chief features which led to the errors in diagnosis were the enlargement of the prostate by rectal examination and a residuum of urine in the bladder, established by catheterization or by percussion. In all of these cases the operation was imperative, without much time for study, and it was only at the time of operation that the correct diagnosis was made. In each case a median perineal operation was performed, the stricture in the deep urethra encountered and divided, and the urethra beyond the stricture found to be dilated throughout the prostatic urethra to the vesical sphincter.

In each instance the dilatation of the prostatic urethra was sufficient to admit the thumb; and its dilatation was the cause of the apparent enlargement of the prostate; for examination of the prostate per rectum subsequent to operation shows the gland to have diminished considerably in size.

Before relating the details of these cases it is interesting to note that had these patients been operated upon for prostatic obstruction by the suprapubic route, the stricture might have escaped detection. In fact, such was the case in one patient upon whom another surgeon did a suprapubic operation. In this patient the prostate was noted as being much enlarged before operation. A dilated prostate urethra was noted and two small lateral lobes or parts of them were removed. A suprapubic fistula remained for many weeks, and a stricture in the deep urethra was discovered later. An external urethrotomy and division of the stricture resulted in the closure of the suprapubic wound.

CASE 1. G. F. R., age 55; referred by Dr. F. N. Stevens, Somerville, Massachusetts, September 10, 1913. Patient denies venereal disease and states that about five years ago the stream began to come slowly, then gradually became smaller; that it has little force and there is dribbling for about a minute after the act. About two months ago frequency of urination became more marked, occurring nearly every hour during the day and three or four times during the night. The frequency

[1] Papers presented at the annual meeting of the American Urological Association, Baltimore, April 13–15, 1915.

remained the same until last week, when the night frequency became every hour. There has been a little pain during the act, no blood, and the patient states that the urine has been cloudy for two or three years. There has been a little loss in general condition due to loss of sleep. The patient complains of small hæmorrhoid which he has had for two years. Patient consulted Dr. Stevens on account of the frequency and difficulty in passing the water. Dr. Stevens believed, from detecting an enlargement of the prostate and a residual urine which showed a cystitis, that the patient had a prostatic obstruction.

Physical examination showed the general condition to be good with slight sclerosis. Heart action regular, sounds clear, no murmur; blood pressure 148. Local examination showed a varicocele on the left, and both inguinal canals weak with a slight impulse on coughing. Rectal examination showed each lateral lobe to be increased to twice normal size, the left lobe slightly larger than the right. The median raphé was present in the lower third of the gland, the surface smooth and boggy. Soft rubber catheters and coude fail to enter bladder, which was finally entered by a bougie-catheter No. 10 Fr. which met obstruction at the tip of the prostate as had the other instruments which failed to pass. A residual urine of eight ounces was removed. The bladder capacity was fourteen ounces. The urine examination showed no renal elements, but had the character of cystitis. The phenolsulphonephthalein was eliminated in eight minutes, and the percentage for one hour was thirty-two.

Operation, Charlesgate Hospital, September 16, 1913. Ether anæsthesia. A grooved staff was passed to a point which was supposed to be the tip of the prostate, where it met obstruction. An external urethrotomy incision was made upon the staff. A dense fibrous stricture was detected in the deep urethra. This was divided and the urethra in the prostate, was found much dilated, admitting the index finger easily. The vesical sphincter was dilated enough to admit the index finger to the bladder. The vesical surface of the prostate was found to be smooth, the bladder moderately trabeculated and without foreign bodies. A No. 32 Fr. self-retaining catheter was passed from the meatus to the bladder and syphon drainage established. The catheter was removed on the eighth day. The perineal wound healed in fourteen days. The patient was seen March 10, 1915, and stated that he has been entirely relieved of his symptoms, passing water about three times during the day and none at night. The urethra takes a No. 30 Fr. sound. There is no residual urine, and the prostate is but slightly larger than normal and almost half as large as before operation.

Case 2. McC., age 65. Entered the nerve service of the Boston City Hospital, September 16, 1914. The doctor who sent the patient to the hospital had made a diagnosis of "paralysis of the bladder." Upon examination the patient showed no signs of any nerve lesion. He denied venereal disease, and his only complaint was incontinence of urine for two weeks prior to admission. The patient was seen in consultation with the nerve service.

Upon physical examination the patient showed a much distended bladder by percussion, and rectal examination showed both lateral lobes increased to twice normal size. Both lobes were equal in size, the surface smooth and softer than normal. The diagnosis of prostatic obstruction was made and the patient transferred to the genito-urinary service. The house surgeon failed to enter the bladder with any instrument, obstruction being met in the deep urethra, and considerable bleeding resulted from the instrumentation.

Operation, September 10, 1914. It was impossible to pass a moderate-sized grooved staff into the prostatic urethra, and after a few attempts an external urethrotomy without a guide was performed. The urethra being "faced," a stricture in the deep urethra was obvious. With a finger in the rectum the stricture was divided by a small knife and found to extend forward about half an inch from the tip of the prostate. The stricture being divided, the prostatic urethra was found so dilated that at first one had the sensation of having the finger in the bladder. The vesical sphincter would admit the index finger easily, being much dilated. The vesical surface of the prostate was smooth. There were no calculi present. With one finger in the rectum and one in the dilated prostatic urethra, the prostatic tissue was found to be very thin — not over one-fourth of an inch — and there was no prostatic tissue which could be removed.

A catheter was placed from the meatus to the bladder and the patient made an uneventful recovery. The symptoms subsided entirely. There was about one ounce of residual urine five weeks after operation, and the prostate by rectum was very small, suggesting an atrophied gland.

Case 3. Man, age 54; referred by Dr. George Farrell. Patient denies venereal disease. Has had "weakness of bladder" for twenty years. Ten years ago noticed increased frequency and difficulty in passing urine and was catheterized a few times. In bed for a few days. Since that time has had increased frequency and during past year urinated six to eight times during day and same at night. Three days ago complete obstruction. Dr. Farrell unable to get instrument into bladder until etherized, and then a metal catheter, No. 14 Fr., passed to bladder with escape of urine, the obstruction being said to be in the prostate. Following this the frequency was twelve times at night and six to ten times during the day. There was pain when the bladder was full and also during the passage of urine. Blood had appeared in the urine off and on, more marked during the past few weeks.

Stream starts with considerable straining. Dribbling for two or three minutes after the act. Past week has wet bedclothes at night. Urine dark and

cloudy for many months. Bowels irregular; has lost little if any weight, but is weak from loss of sleep and worry. Physical examination shows patient to be in fair condition, but weak. Pulse regular, high, good volume. External genitals normal; small hæmorrhoids; no hernia. Both lateral lobes of prostate much enlarged outward and upward. Median raphé not present. Gland, hard surface, smooth, not adherent to rectum. Operation advised.

Operation, October 7, 1910, Charlesgate Hospital. Grooved staff meets obstruction in membraneous urethra near apex of prostate. Forced through into prostatic urethra, giving the sense of being in the bladder. External perineal incision. Finger introduced into prostatic urethra, which is found to be much dilated, being larger in circumference than the thumb. No line of cleavage of prostatic lobes could be found. Vesical orifice normal. Finger in rectum and finger in the wound shows prostatic tissue to be less than one centimeter in thickness. The prostatic urethra and vesical sphincter give the impression that the prostate has been removed. This dilated condition is unquestionably due to the stricture in the membraneous urethra, the stricture being divided by the perineal incision. Bladder palpated and sounded for stone; none present. De Pezzer catheter and syphon drainage established; wound packed with iodoform gauze.

On the perineum were two scars — one on either side of the median line — which connect posteriorly just in front of anus. It was learned that the patient was shot in the perineum when a youth, and this was probably the cause of the stricture.

Catheter removed eight days after operation; controlled water perfectly from the first. The perineal wound healed slowly, not closing for three weeks. The patient had no instruments for six months following, as he felt so well that he said he did not require treatment, being able to hold water all night and going but six times during the day.

On March 22, 1911, the patient was seen, and he complained of having passed water with slight difficulty for two days, although there was no frequency. Bougie No. 17 Fr. tight in deep urethra.

The patient came for dilatation, and in ten weeks the urethra was back to No. 28 Fr. and he was without symptoms.

During the past four years the patient has been seen occasionally, but on account of having had a chill following instrumentation four years ago he refuses to have any instruments passed. Except for the fact that the urine comes slowly, he states, on March 8, 1915, that he is free from symptoms.

DIFFERENT TYPES OF FIBROUS OBSTRUCTION OF THE BLADDER OUTLET AND THEIR TREATMENT

By CHARLES H. CHETWOOD, M.D., LL.D., F.A.C.S., New York
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IT is difficult to approach the subject of obstructions about the neck of the bladder with a clear understanding of all that this phrase implies; and seemingly it has always been, which is due apparently to a confusion of terms. It was so away back in 1840 — seventy-five years ago — when Mercier made his still often quoted contribution on the "Causes of Retention of Urine in the Aged." It was still so in 1875, at the time of the extensive investigation of Socin. It was so when the exhaustive researches of Ciechanowski were published in 1902. And it remained so after this memorable work, and remains so, to a certain degree, in the minds of many of our modern observers.

We are too familiar with the types of prostatic obstruction which are described as lateral, bilateral, and median lobe hypertrophy; and for the treatment of this condition, the controversy between the merits of suprapubic and perineal prostatectomy has diverted attention from the consideration of other equally important conditions which produce obstruction around the neck of the bladder.

Ciechanowski's conclusions, namely, the inflammatory and probably gonorrhœal origin of most cases of prostatic enlargement, have been rejected by the majority of observers; yet the same author has set forth in clear terms much that is true, particularly in relation to the importance of inflammation as a principal and contributory element in the end-result of obstructive prostatic and vesical conditions; and, of course, it is the end-result that has the greatest significance in weighing the value of any operation. The peculiar importance that is given, on the other hand, to the mortality percentage, apart from other considerations, would convey the belief that surgical skill in operating bears a direct relationship to such mortality rate; whereas, in a certain percentage of cases, it makes little difference who operates, as there are certain conditions that belong to the pathological and clinical history that have a much greater determining influence upon the surgical outcome, and this is brought to light by a proper analysis of each individual case.

I will not undertake to enumerate all of the important features that should determine a classification of cases. It is well known that an analysis based upon the size of the growth, the amount of residual urine, the activity of the urinary symptoms, affords a very inadequate idea of the gravity of a given case; and while these factors have some bearing upon the question of operation, they give no indication as to its magnitude or prognosis. We know that the condition of the kidneys is of great moment in connection with all surgical operations in any part of the body, but reaches a prime significance in operations upon the urinary apparatus. The involvement of the kidney is an important element in determining the prognosis of prostatectomy; moreover, a series of classified cases has a better prognosis in one stage of this malady than in another stage thereof. This is so self-evident that it is mentioned only as part of an appeal to arrange the cases for discussion and report with a view to the considerations based upon analysis of the principal features belonging to them.

The phase of this subject to which I desire to give emphasis has reference to the structural composition of prostatic and vesical obstructions, and its bearing upon the operative end-result.

Generally speaking, we have three types of prostatic enlargement: adenomatous, fibrous, and malignant. I shall confine my remarks to the adenomatous and fibrous types of prostatic growths.

In brief terms, we understand that the pathology of prostatic hypertrophy involves a more or less extensive overproduction of the glandular and intervening connective-

tissue elements of the normal histological structure which has been designated hyperplasia. It is a well-recognized fact that as the glandular or connective-tissue elements predominate, so is there in the former a softer, as in the latter a harder, growth of prostate. This variation is readily recognized, but it does not embrace that which I desire to classify as the hard or fibrous prostate. While there may be a difference of opinion in this respect, I deem it desirable here to denote as the representative example of different classes the extreme types of such, in order to make the distinction perfectly clear.

We have in the case histories of many prostatics the indication of the existence at one time or another of inflammation. This may be due to a specific bacterial invasion, such as gonorrhœa of acute degree or low-grade chronic inflammation of the ordinary pyogenic organisms. It may be due to the trauma of a foreign body. It may be confined to the vesical cavity, in the form of a cystitis, when it may have no appreciable influence upon the composition of the growth inside of this viscus. But it may be submucous in location. In this case it is the cause of the reproduction of that essential inflammatory tissue, fibroplastic material. Now, this is not what results from a greater degree of connective tissue in the ordinary glandular enlargement, but of an essentially morbid tissue, the tendency of which is to encroach upon the preëxistent glandular structure, and, by eliminating most of it, preclude its further growth or development. From this is evolved what might be fittingly called the true fibrous prostate, so typical in its composition of characteristic density and material; and its presence has a most important bearing upon the technique of operation and upon the prognosis, or degree of success, thereafter.

From studying the pathological anatomy of hypertrophy of the prostate, we have learned of the predilection of glandular hypertrophy for the middle lobe; that the extension of its growth is in the direction of least resistance — upward into the bladder, and backward into the rectum; that the so-called capsular boundaries of such a tumor are formed by the compressed and atrophied prostatic structure, and that in a soft prostate this affords a very helpful means of enucleating the part to be removed — the more so when the glandular element predominates and relatively less so when the connective tissue intervenes.

Now, the true hard or fibrous prostate is not, as some have alleged, a secondary or more advanced state of the first variety, but is a distinct and individual formation. It, therefore, is likely to grow in different portions of the gland and of the adjacent structures that have variable anatomical limitations, such as the sphincteric ring and the trigone; or, if they involve the middle lobe proper, the inflammatory degree being of such intensity that the glandular elements are excluded early in the progress of the morbid process, so is determined a small fibrous growth at this site. The degree of obstruction may be just the same from such a growth, be it lobular or concentric, as that of a much larger lobulated prostatic growth. Other clinical evidences of this variety are more likely to be those, I believe, which signify the so-called irritable prostate, characterized by an undue frequency of urination, of much greater activity at night, with small quantities of urine, in distinction from the progressively enlarging adenomatous obstructive prostate, with dilating bladder, until complete retention and much distention have ensued, causing nocturnal overflow instead of spasmodic incontinence.

Whatever position we may take upon the question of the causative agency of inflammation of prostatic hypertrophy, *per se*, we must at least admit the important bearing that inflammation has upon all of those structures that are concerned in the production of the symptoms that demand relief — a superadded agency that must be reckoned with. It is this element that affects the activity of the symptoms, the facility of operating, and the ultimate result to be expected following operation. It is therefore a most important element to be weighed in the analysis of any case.

In the first place, as regards the clinical symptoms: Without inflammation there are

no clinical symptoms of prostatic hypertrophy until much mechanical obstruction supervenes. We frequently witness the dilatation of an obstructed bladder, until it is capable of retaining several pints of urine, before the patient deems it necessary to seek medical or surgical aid. How different it is, however, with cystitis. When the cystitis is present at any stage of the malady, then we have that train of symptoms which is identified by the name of "prostatism," but which is largely contributed to by inflammation of the bladder.

With this same element of inflammation extending itself further, leaving out entirely the remote effect upon the kidneys, we have a more deep-seated condition: a deposit of that fibroplastic material that characterizes inflammation beneath the mucosa. If this is localized in the region of the vesical sphincter, there may be a contracture of the neck of the bladder. If it is more generalized, we are likely to have a permanently contracted bladder capacity. Both of these conditions may exist independent of, or in combination with, the true types of adenomatous prostatic hypertrophy; therefore both have a very important bearing upon the operative procedure and the result attained thereafter. When this inflammatory process is circumscribed, being confined to the limits of the prostate itself, in certain cases it is not difficult to understand how there is produced a hard and contracted body, owing to the deposit of fibroplastic material and the elimination of glandular substance, which may form the small, so-called hard prostate in the median isthmus, or a circumferential deposit around the sphincteric orifice, producing contraction, in which latter instance it may belong to the class of stricture of the outlet, contracture, or the circular type of prostatic obstruction. Therefore, the small, hard prostate, the prostatic type of contracture, and the prostatic variety of stricture are all allied to each other and are different degrees or variations of a similar pathological process.

So much for certain differences in pathology and clinical symptoms; and, lastly, a very important difference is that which affects the ability to treat these various conditions surgically. As has already been stated, and as is generally known, the soft or adenomatous prostate is easily removed, both by perineal and suprapubic approach, and the difficulty is in inverse ratio to its size. The fibrous prostate cannot be removed by enucleation, and attempt at such removal will lead the inexperienced surgeon into a tedious, unsurgical, and sometimes disastrous situation of lacerated structure, and unsatisfactory attempt at removal of the obstructing area — to be followed later by a cicatricial contraction which will leave the patient unrelieved, if indeed he is not carried off by a urinary infection or septic thrombosis and embolism.

I have had occasions to operate on account of complete retention of urine, which proved to be due to a fibrous contraction of the bladder outlet following a previous attempt to remove a fibrous prostate. In such instances there has been found a tight ring at the neck of the bladder, in place of the normal elasticity. Of course, this may have been present at the time of the first operation, but it is difficult to understand how it could be overlooked. At all events, it is more apt to be a sequel to the removal of a fibrous growth than to one of the adenomatous variety. I have operated suprapubically some time after a strenuous undertaking at removal of a fibrous prostate perineally, and have found that such attempt has occasioned so much laceration that the prevesical structures were invaded, with infection of the space of Retzius. There had resulted a perivesical inflammation and permanent contraction and limitation of the bladder and its capacity. It is these surgical enormities — and I have had my share of them, by priority, as well as by succession — that make us stop and think, before proceeding aimlessly.

This type of prostatic fibrous intrusion should be handled according to its location and extent; to be carefully observed, previous to operation, by deliberate cystoscopic study. When the obstruction consists of a distinct bar or bridge formation, my early and late experience agree in favoring the galvanocautery incision through a perineal opening, provided there be no intra-urethral obstruction or peri-urethral involvement, so that the

way can be cleared by such incision without invading too deeply the prostatic structures. Unless proper consideration be given to this important point, the result of the procedure will be seriously impaired and a valuable technique discredited.

Some types of small fibrous prostate that are anterior to the urethral orifice may be better attacked by careful dissection through perineal incision. In these cases it is desirable to accomplish the removal of tissue, if possible, by submucous excision. It is furthermore important to have in mind the pathological formation of the condition attacked, because, being a fibroplastic deposit more or less diffuse around the bladder outlet, it is likely to invade the muscular tissue of the sphincter, which latter is already impaired and will perhaps be further enfeebled by removal of the encroaching structure. It is on this account especially demanded, in these cases of perineal operation, that strict regard be given to the integrity of the external sphincter surrounding the membranous urethra, as it is upon this that the future bladder retention must rely. In entering the perineal body, incision of the deep structures should be made well behind the bulb, and retraction forward should be facilitated by severing the central tendon. Exposure of the apex of the prostate is then accomplished, as in extra-urethral prostatectomy, and removal of the invading tissue carefully conducted — if possible, under the eye, and if not, by deliberate excision, not by blunt enucleation. It is much better to make more than one incursion against the obstacle attacked than to forfeit anything by doing too much at one attempt at its removal. It is a matter of first appreciating the actual conformation or structural abnormality to be dealt with, and then of doing enough without the penalty of overdoing it.

Other forms of fibrous prostate which lie in the isthmus, behind the urethral orifice, may be reached by suprapubic section. In these instances the undertaking should be equally deliberate, and should be pursued under direct ocular inspection. Some of these cases may be successfully treated, when the internal urethral orifice is exposed to view suprapubically, by forced divulsion thereof to the extent of splitting the sphincteric ring. Some of the cases will be found suitable for galvanocautery incision through the suprapubic wound, when examination with the finger determines that such an incision will adequately open up the bladder outlet.

On the other hand, when there is a more extensive growth and irregular deposit demanding total excision, this is accomplished, as in the perineal operation, by submucous removal if possible, but in any case by cautious excision. At all events, it should be constantly remembered that the character of the tissue to be removed enhances the danger of laceration into the surrounding structures and the secondary occurrence of urinary infiltration, complicating the immediate and ultimate result to the detriment of both.

In conclusion, it may be stated that the clinical symptoms of prostatic or vesical obstruction are without a uniform anatomical basis, whether they occur in the old or the young. One of the anatomical bases is to be found in the deposit of connective tissue or fibroplastic material, at the expense of the normal glandular or muscular substance, when as a result of such deposit there occurs an orificial obstruction of the bladder; or if, on the other hand, a prostatic hypertrophy exists, causing obstruction, such mechanical interference is responsible for part of the symptoms; and after the removal of such obstruction the function of the bladder returns to normal, only provided that the wall of the bladder has not suffered marked permanent changes in structure. In a word, age and mechanical obstruction are both important factors in influencing the degree of irremediable changes in the bladder wall; and the highest degree is reached when to the other influence is added a chronic inflammatory process.

PROSTATIC OBSTRUCTION WITHOUT HYPERTROPHY

By BENJAMIN TENNEY, M.D., F.A.C.S., Boston

SIXTY-FOUR cases, helpful in considering this subject, have been submitted by members of this society. For these I wish to express my thanks.

It is well understood by urologists that malformations of the prostate, both congenital and acquired, may produce obstruction to perfect emptying of the bladder before these deformities produce any increase in the size of the gland as a whole. We know that such obstructions with the usual sequence of symptoms do occur in prostates which are actually smaller than the active adult gland, but it is unfortunate that many practitioners still fail to realize this fact and delay appropriate advice and treatment because they find no mass projecting into the rectum. This has led to the acceptance of theories of vesical atony in cases where the atony or incompetence is only relative and in which the removal of an obstruction, which a sound bladder, reinforced by competent abdominal muscles, might overcome, would reëstablish normal function.

It is true that our best operators report cases with and cases without the symptom-complex of tabes in which an operation has been done without relief of bladder symptoms, and these are offered as evidence of an inherent paralysis of the bladder musculature. Other cases are reported in which an operation has completely relieved these bladder symptoms in patients as frankly tabetic. Doubtless these diverse results may have occurred in the experience of some of us and compelled us to choose between admitting an incomplete operation and accusing the patient's bladder of incompetence. The question of vesical atony, or paralysis of the musculature of the bladder, awaits a definite answer; but the appearance of trabeculation in a bladder has always seemed to the writer to indicate a hypertrophy of muscle to overcome resistance rather than a condition due to deficient nerve stimulus to the organ.

Congenital malformations of the prostate are rarely described or even referred to. Lowsley has given a full report of a case of prostatic malformation in an infant of three and one-half months, with references to cases reported by others. Cases have been reported by Bransford Lewis and others in which the obstruction was known to exist in early youth and must have been developmental if not congenital. With many well-known failures of perfect development in this region, it is surprising that so little is known of congenital prostatic deformities and malformations. It may be that some of the obstinate cases of nocturnal enuresis are merely the dribbling overflow of an overdistended bladder behind a deformed and obstructing prostate. I have found no record of any investigation of this point.

As to the age of patients with obstruction without hypertrophy, the earliest age for occurrence of symptoms among the cases reported to me was nineteen. Thirteen of the group of sixty-four cases had symptoms of obstruction before forty. I have no figures for comparing the time of onset of symptoms with those produced by hypertrophied prostates, but the time for operative relief can be compared with that for general prostatic operation. One per cent of 816 prostatic operations previously collected and discussed were operated on before fifty years of age, while 20 per cent of the cases reported to me were operated on before that age, and 30 per cent were operated on before sixty, as compared with 16 per cent of the general prostatic operations. Obstructions due to prostatic deformity may produce symptoms at any age, and it will be interesting to learn whether the younger men whom we relieve of symptoms by removal of their small deformities later develop a second obstruction through a general hypertrophy of the glandular tissue. If there is a method of dealing with these early and small deformities which will decrease the chance of a later hypertrophy, that method is worth considering.

A differential diagnosis between old connective-tissue changes in the membranous urethra and obstructive changes in the prostate is almost always possible, but is sometimes difficult. The two regions are close together, and there is no symptom particularly belonging to either. Age gives a suggestion often misleading, for we see obstructing strictures in men of sixty and older, and prostatic obstruction in men of forty and younger. A previous urethritis or perineal injury does not insure the presence of stricture in the membranous urethra or guarantee against prostatic deformity. Instrumentation may be difficult, and residual urine may be present with either condition. The feel of the sound as it passes through the narrow area, the deviation of its tip to the right or left, and rectal touch while the sound is in the urethra, are all helpful and sometimes sufficient for our diagnosis. Fortunately, by the time we can use a cystoscope with ease, dilatation has removed one of the diagnostic possibilities and we have to search for the obstruction in the prostatic region.

Approximately one-third of the cases reported to me gave a history of previous gonorrhœa. This agrees with what others have reported. If the gonococcus ever plays any part in producing these minor obstructions, other organisms must be equally competent and more common. The infecting organism must be descending or hæmatogenous; and the close relation of the small but still enlarged glandular masses to the urethral mucous membrane suggests that the infecting agent may be brought by the urine in many cases if not in most. Stone in the bladder has been assigned a causative rôle, but when we find stone without these deformities, and deformities without stone, we must admit coincidence rather than cause and effect.

Prostatic obstruction without enlargement may be due to —

1. Dense layer of new-formed connective tissue below the mucous membrane and infiltrating the internal sphincter — the fibrous ring.

2. The same process with chronic inflammation of the submucous gland tissue — the bar.

3. Hypertrophy of submucous gland tissue involving the suburethral or subtrigonal groups or both — the hypertrophy in miniature.

4. Connective tissue replacing the glandular below the internal sphincter muscle — the fibrous prostate.

5. Congenital malformation.

Clearly, the conditions here suggested do not call for the same treatment. When the obstruction is small and strictly confined to the region of the internal sphincter, it is possible to get good results by methods that do not apply to the general condition which we know as the small fibrous prostate. In this condition we are practically dealing with scar tissue which must be stretched or cut through or removed as completely as possible. Connective tissue with its tendencies to contraction, reproduction, and occasional hypertrophy is poor material for surgical work. A result which is satisfactory at first may be quite the reverse after a few months of neglect; and permanently good functional result, whatever the operation, depends on the patient's faithful attention to his sounds.

Of the sixty-four cases reported to me, forty-six were operated on through the bladder and thirteen through the perineum. There were four deaths, three of which followed perineal section; but some of these cases were attempts to remove the hard fibrous prostate, and this operation is often long and difficult. They cannot fairly be compared with a list of cases whose lesions were confined to the region of the internal sphincter. The results of the operative treatment of these cases were satisfactory in forty-seven, unsatisfactory in eleven, death in four, not given in two cases. Unsatisfactory results followed the perineal approach seven times, the suprapubic operation three times, and the Bottini cautery once.

A punch as suggested by Young, or a cautery as used by Chetwood, or some other method of applying heat, will destroy obstructions which are in close relation to the internal sphincter and give entire relief, but the obstructions extending down into the urethra call for more serious treatment.

My personal cases, with the exception of

one which presented a small median projection completely blocking the vesical outlet which was destroyed by an electro-cautery through an open tube, have all been approached through a suprapubic incision.

One man still has rather frequent and sometimes painful urination, though not enough to drive him to an operation; four others, one a tabetic, had a perfect functional result, and a fifth, seventy-two years old, died suddenly after his return home with a healed and comfortable bladder.

The suprapubic approach gives an opportunity for removal of obstruction at the bladder outlet and then, by palpation between the finger in the rectum and the finger in the bladder, for demonstrating the complete absence of all further obstruction after such removal. Hæmorrhage can also be estimated and perfectly controlled. The intra-urethral procedures seem less important to the patient and his friends and may be repeated without much argument if not completely successful at first.

Cases with small obstructing nodules and bars give the most satisfactory results of treatment. When the obstruction is removed there is no after-treatment, and the patient is as well as if he had never suffered his disability.

Cases with extensive fibrous changes in the gland are benefited by operation, but the duration of the improvement depends on the persistence of patient and surgeon in the after-treatment. Without this they may easily relapse into a condition as serious as or worse than that which first sent them to the surgeon.

THE GOLDSCHMIDT AND WOSSIDLO TECHNIQUE IN HANDLING OBSTRUCTIONS AT THE VESICAL NECK

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VERY great progress has been made during the past five years in diagnosis and treatment of diseases and conditions of the posterior urethra, especially so in handling contractions, bands, scars, etc., at the vesical orifice. By the old methods of endoscopists, we must not lose sight of the fact that the pathological changes of the posterior and prostatic urethra and their many relations to disturbances in the urogenital apparatus were recognized to a great extent and treated, but they had to work under great technical difficulties, and their results were certainly inferior to what we secure today.

The introduction of the older endoscopes, particularly those of the straight-tube model which was used at this time, was often attended with difficulties, and required great technical dexterity on the part of the surgeon. The difficulties were from bleeding and the constant leaking of the urine into the field.

It seems almost superfluous for me to call attention to the fact that these procedures must be used only in selected cases under the most rigid and careful asepsis; in cases in which tolerance in instrumentation has not been established, the same painstaking methods must be used as are used in cystoscopy or any other bladder or urethral instrumentation. Disappointments will be less frequent and better results will be obtained by vigorous attention to these details and by a thorough mastery of the technique and of the use of the instruments under discussion.

Tandler and Zuckerkandl agree that hypertrophy of the prostate always begins in the middle lobe and that the mechanism of the bladder closure and the emptying of the urine may be ascribed to the sphincters of the prostate. Wilson and McGrath also agree in these findings.

Wossidlo says, "Since Oberlaender in 1893 wrote his textbook on urethroscopy, we have made very remarkable progress." In the first place Oberlaender and Kollman have based and perfected upon urethroscopy the diagnosis and therapy of chronic gonorrhœal

urethritis, and their teachings today have been accepted by all urologists. Goldschmidt's first model consisted of a straight fenestrated tube which carried a lamp at its closed end. This was improved by a flat lamp introduced into the straight tube, parallel to the optic.

Recent investigations have convinced many urologists that the Nitze-Oberlaender with a Valentine lamp is preferable to the irrigation urethroscope, because the water pressure often causes the softer infiltrations of the urethral mucosa to disappear and only the coarser plastic changes to remain visible.

The view obtained from the use of the older urethroscopes was small, and great patience was necessary to interpret them properly, and this fact explains why so few urologists used posterior urethroscopy. E. L. Keyes, Jr., emphasizes the point that in theory, as in practice, the problem of retention is mechanical; the bladder neck, and especially the elevation of its inferior lip, is the important mechanical obstruction. Goldschmidt's instruments permit of cauterization of the vesical neck, but local applications cannot be made with the same. For moving forward and backward, and for lifting and lowering the cauteries, his instruments are provided with a complicated set of screws which renders technique difficult and necessitates frequent repairs. A further disadvantage is that all instruments must be held in the median line, where they run in an unchanged direction, and that a change of the operating instrument requires the removal of the tube, as almost every instrument is fitted to a tube of its own.

Quite frequently the pains of dysuria bring a patient to us with cloudy urine, and some of these cases have swelling of the mucous membrane, granulations and polypi on the border of the internal sphincter of the bladder, or at any other place in the deep urethra.

In chronic prostatitis we see the walls of the prostatic urethra rigid, and this rigidity does not disappear on pressure with air or water. Often berry-shaped growths project into the urethra.

H. Wossidlo has published a report of a case of tuberculosis of the posterior urethra, so that we readily see how accurate a diagnosis can be made with his instruments.

The bent tube of Wossidlo has received a slight turn at the convex side which gives a greater field of vision, so that a larger area can be viewed.

To enable one to use the urethroscope under a moderate air pressure and to gain a better distention of the urethral walls, a small tube has been attached through which air may be forced by aid of a bulb. The tube rises at its vesical end to a cone which occludes securely the orifice of the bladder. The drainage tube attached to the sheath permits a thorough irrigation of the field without a rapid filling of the bladder with the irrigating fluid, as is the case with the Goldschmidt instrument, where, when the optical tube is introduced, the liquid has no other exit than into the bladder. It is easy to wash away any blood that may interfere with the examination or treatment, and the picture becomes more rapidly clear. The latest model of the Wossidlo instruments is very simple, permitting, as it does, of the change of operating instruments with the tube always in place after once placed in the bladder, and at the same time the instruments may be moved readily from their axis. Many different instruments can be used through the same tube, as a galvanocautery, galvanocautery knife, a curette, a sharp pair of tongs or scissors, needles, probes, sounds, etc. One directs the instrument toward the place to be operated upon by the aid of the optic, then removes the ocular, opens the cock on the shutter, and slides the desired instrument through the opening below the optic, and then the ocular is replaced. When the galvanocautery knife is used we recognize its action by the appearance of fine bubbles of gas, and then the burnt tissue turns white. Deep cauterization should always be avoided, as it is much better to repeat after ten days if it should become necessary.

I shall not at this time go into a detailed report of the cases in which I have used the Goldschmidt and Wossidlo urethroscopes, but will give you a few details regarding these instruments and their uses. The Goldschmidt instrument is constructed in a num-

ber of different models. The one I use is the posterior urethroscope with the galvanocautery attachment. Goldschmidt and others have used the cautery repeatedly on the same patient, and numerous incisions of the obstructing median lobe or obstructing bands have been made at different times. The delicate construction of the instrument is one of its most serious drawbacks. I have seen quite a large number of cases on which perineal or suprapubic prostatectomy had been performed and the retention and residual urine not entirely, or at all, relieved by these procedures, but in which one or more cauterizations with the Goldschmidt cautery relieved the residuum or retention. Sometimes, after a prostatectomy, when made even by our best and most able surgeons, contracting bands will recur and residual urine result from this recontraction of the bladder neck. This condition I have seen occur after both perineal and suprapubic prostatectomy.

In using the cautery (Goldschmidt or Wossidlo, Jr.), bleeding occasionally occurs and obscures the field of vision, although if considerable care is used and strong pressure of the irrigating fluid secured this can be avoided. I have never seen any alarming hæmorrhage take place, however. A large residuum can be reduced several hundred cubic centimeters even after a single cauterization in some cases.

The statements most often made by those opposed to the method, that it is unsurgical and that the repeated cauterizations leave the prostatic portion scarred and battered, are not true of the procedure in the hands of careful operators. If used in all cases of prostatic obstruction, the method, on the whole, is bound to be a failure. The contention that in those cases in which cauterization has been performed prostatectomy afterward becomes a necessity, because of infection and replacement of the cauterized tissue by new-growth or the obliteration of the new channel by the enlargement itself, is well founded if this operation is used in cases which are not adapted to it.

In a recent article Dr. Young says:

"During recent years I have appreciated more and more that there existed a group of prostatic obstructions which could not be very satisfactorily tested by either perineal or suprapubic prostatectomy: the cases of inflammatory median bar formation or contracture of the neck of the bladder."

I have developed an entirely new procedure — the urethroscopic median bar excision by means of a special "punch"— which I have used since April 20, 1911, on about seventy patients with no deaths and with excellent results. This method makes it possible to perfect the result obtained, either by perineal or by suprapubic prostatectomy, in cases in which, by the contracture of the tissues after operation, slight obstruction is produced.

The instrument of Buerger is valuable for examination, and I wish it were possible to have the cautery feature attached.

A great instrument was brought into use when Nitze perfected his cystoscope. Obstacles which had seemed unconquerable surrendered, one by one, to his energetic and persevering will, until a result was attained which is so simple that the original problem appears to have been an easy one. Without relying on the achievements of others, Nitze worked independently and set up in place of unsafe and uncertain methods, which could be carried out only by masters in our profession, an easy, positive, and definite method of examination which has proved a blessing to sufferers.

ADVANCE IN ENDOSCOPIC METHODS

Endoscopy of the stomach, according to the method of Nitze, was later taken up by von Mikulicz, who also developed the exploration of the urethra with an instrument which made it possible to throw light into this canal. Oberlaender likewise advanced and improved this method, but in spite of his efforts he was unsuccessful in reaching a result which can be compared with that of illuminating the bladder. Goldschmidt says: "We are now able to know the exact normal or pathologic conditions of the bladder, and the same may be obtainable for the urethra."

The old endoscopic experiments on the bladder and urethra by Desormeaux, which

were carried on still further by Grünfeld, consisted in nothing more than the insertion of the largest possible tube; over the inserted end of the tube, one portion of the mucous membrane of the bladder after another was viewed, as the tube was withdrawn, by the reflection of light through the tube from the outside. At the best, only such portions of the wall of either the bladder or the urethra could be viewed at one time as could be surfaced over the end of this small tube. This condition of affairs was changed, as far as examination of the bladder was concerned, when Nitze invented and applied a finely developed lens system, by the aid of which he could view a portion of the bladder many times larger than the inserted end of the instrument. Not all improvements in the last ten years were essential to the principles of the shape of the instruments, but have been usually applied to the electric technicalities of the lighting features of the different cystoscopes and urethroscopes. Excellent photographs of the interior of the bladder and urethra, attesting to the diligence and ingenuity of the photographer Kollman, have been made by the use of different appliances.

Goldschmidt started his experiments some years ago along the line of Nitze's lens system, and by hard work and close observation to detail he was able to solve the problem. By the use of cystoscopic optic and convex lenses of smaller diameter than the object to be seen he produces a wide field of vision. When such collective lenses are inserted into a lighted tube, the rays coming from the inner surface and end of the tube will be gathered by the lenses, affording a view of the interior, at the end of the optic. This picture can be enlarged through a convenient ocular, just as is done with pictures of relative objects in endoscopy.

Many trials were necessary before Goldschmidt was able to construct a practicable and simple instrument. In the progress of his work Goldschmidt used only living subjects and constantly adhered to practical methods. He used water as a dilating medium, instead of air or any of the various gases. While trying to produce the largest possible expansion by strong pressure of the dilating medium, he found, much to his astonishment, that only a little dilatation was necessary to produce a uniform tube of the urethra which could be accurately viewed with his optical appliances.

THE GOLDSCHMIDT INSTRUMENT AND ITS USE

The instrument is so constructed that a stream of water can flow through the space between the endoscope and optic into the urethra and douche it out. The instrument ends vesically with either a rounded point or a bill-shaped point, and is inserted with a well-fitting obturator into the urethra, permitting cold or hot boric-acid solution to run from an irrigator into the water chamber. To douche out the anterior urethra only a slight pressure is necessary, but to douche out the posterior urethra it is necessary to raise the irrigator to about 2 meters above the pelvis of the patient. When the obturator is withdrawn, the optic is inserted, the water-chamber closed, and the electric cables are connected.

The form of the instruments is such that their insertion and handling for ordinary cases cause no pain, and all operations can be done with local anæsthesia. Bleeding does not often occur. Infection is reduced to a minimum by the continuous irrigation with boric-acid solution. The normal anterior urethra by physiologic dilatation is like a uniform tube, much like the inner walls of the arteries; complete and incomplete rings can be seen, and the uniformity of the mucous membrane is interrupted only by shallow papillæ and indentures, which are sharp-cut, round openings, and when infected become enlarged and deeper and often appear diverticular. The mucous fibers are often firmly attached to the mucous membrane and cannot be dislodged by a strong stream of water in chronically infected urethras.

It is interesting to observe how man is able to open voluntarily the mouth of the bladder as soon as he chooses to empty the bladder. This method no doubt will be much used to diagnose causes of nocturnal enuresis, as direct observation of the act of urination can be secured.

By changes in the prostate many disturbances of urination take place, especially in cases of enlargement or distortion of the middle lobe. Goldschmidt says: "We often find that the sphincter does not close, but irregularly cleaves." Whether the posterior urethra acts as a reservoir in the act of urination was much discussed some years ago. If the mouth of the bladder closes completely, which as a rule can readily be seen by the aid of the instrument, it becomes easy to decide whether the sphincter is properly functionating. Many and varied causes of disturbances of urination and difficulties in the prostatic urethra can be analyzed by direct observation of urination.

In cases of enlargement of the so-called middle lobe, and the lengthening of that portion of the urethra between the colliculus seminalis and the entrance to the bladder, one can see, when the patient urinates, how this middle lobe is pushed forward and the lower wall of the prostatic urethra is pressed against the upper wall, and, instead of a relaxation, a contraction of the urethra takes place. The lateral walls of the urethra become changed from old infectious processes, and in comparison with a normal urethra appear granulated, hard, and inelastic. In the prostatic urethra are found many mucous accessories and polypoid tufts.

If the light is passed just into the bladder the internal sphincter can be seen, and by moving the instrument one can appreciate the thickness of the lips of this orifice; any irregularity or thickening of the edge can also be observed very distinctly. The difference is particularly remarkable in cases of hypertrophy of the middle lobe of the prostate. The larger the lobe the more one is obliged to push the instrument inward until the protuberance of the sloping part of the bladder is reached. As the window of the urethroscope is divided into half centimeters, one can ascertain the size of the sphincter's edge, which normally does not exceed 0.25 cm.

The neck of the bladder having lost all elasticity, every effort at evacuation of the urine is followed by convulsive movements of the prostatic and posterior urethra. These movements also accompany the passage of the contents of the bladder into the posterior urethra. The clear water used for irrigation becomes turbid, being mixed with the contents of the bladder by these movements of the urethra.

If slight bleeding occurs, the hæmorrhage is washed away by the water which constantly flows through the visual field. The prostate presents in the field, and not only the anterior portion, but also the prostate, is seen in its entirety, as the tonsils are seen in the throat.

The operation of Bottini and Freudenberg's modification thereof were performed in complete darkness, and are not to be compared with the Goldschmidt or Wossidlo methods, by which a full view can be obtained. The diagnosis, even by cystoscopy, shows only the prostatic prominences in the bladder, while most of the protuberances which prevent the evacuation of urine are caused by projections of the prostatic gland into the prostatic urethra.

It is unnecessary for me to say that the Goldschmidt method is not intended to replace prostatectomy in any way, but I positively know that these methods will, if properly used, decrease the number of radical cutting operations, the same as litholapaxy performed by a skillful operator has done away with the necessity of opening the bladder.

NOTE.—In this review of posterior urethroscopy I have quoted freely from the writings and observations of Goldschmidt, Wossidlo, Frank, and many others.

REMARKS ON THE CLINICAL TYPES OF PROSTATIC OBSTRUCTION AND THEIR SURGICAL MANAGEMENT

By H. A. FOWLER, M.D., F.A.C.S., Washington

IN any comprehensive discussion of the indications for surgical interference in obstruction at the vesical outlet, it would be necessary in the first place to consider in detail the underlying conditions producing obstruction at this level, and to consider the character and degree of obstruction produced. It would then be in order to discuss the indications for surgical interference in each group of cases separately. When we consider the various pathological lesions at the level of the bladder orifice — lesions of the seminal vesicals, inflammatory changes resulting in contracture, deep urethral stricture, and papilloma, vesical growths at or near the sphincteric margin, and prostatic adenoma, abcess, tumors, and sclerosis — which result in interference with urination and produce obstructive symptoms, we can readily understand that such an ambitious undertaking as that indicated would far exceed the limits of several papers and would really cover the whole subject contemplated in this symposium. The time allowed does not even permit a thorough discussion of the rôle played by the prostate in the production of obstruction or an outline of the indications for surgical interference in the different forms of prostatic obstruction. I shall therefore limit my contribution to this symposium to some remarks on the clinical types of prostatic obstruction and their surgical management.

Important as the other lesions are from the standpoint of diagnosis and the selection of appropriate treatment, it is nevertheless true that, in the majority of cases, obstruction at the vesical outlet is due to, or associated with, changes in the prostate gland, and that the application of appropriate treatment directed to the prostatic lesions is followed by the relief of the symptoms of obstruction. Any obstruction at the vesical neck results in vesical retention. This varies in amount from a few drams of residual urine to complete retention. As a result of the obstruction there is also difficulty in voiding. This may be so slight as to be scarcely noticeable or it may so extreme as to dominate the whole clinical picture — marked frequency, urgency, tenesmus, hæmorrhage, etc. The degree of obstruction, therefore, is measured by (1) the degree of vesical retention and (2) the degree of difficulty in urination.

It is a well-recognized fact that there is no constant relation between the degree of obstruction produced and the character and extent of the changes in the prostate. For example, a prostate weighing two hundred grams and another weighing twenty grams may produce the same degree of obstruction; the symptoms in one case are quite as marked as in the other. A man with a huge bilateral prostatic adenoma may have no residual urine whatever, and may present few or no other symptoms of obstruction, while another patient with only slight changes in the prostate, so slight indeed as to be detected only by a very thorough and searching examination, may present marked obstructive symptoms with complete retention of urine. It is abundantly evident from observations of this kind, which are not isolated examples, but are on the contrary supported by the experience of every genito-urinary surgeon, that the degree of obstruction as measured by the amount of residual urine and the difficulty of urination bears no relation whatever to the degree of enlargement of the prostate and gives us no clue as to the character and extent of prostatic involvement.

In reviewing my own experience, together with the literature relating to prostatic obstruction, it seems to me convenient for this discussion to separate these cases into several distinct and well-defined clinical types which will embrace all the clinical forms of prostatic obstruction. The basis for this classification or grouping of cases must of necessity be the changes in the prostate as determined by

various clinical methods of examination. Vesical retention and the other sequelæ of prostatic obstruction are the conditions for the relief of which surgical interference is undertaken. These vary widely in different cases belonging to the same clinical type or group and, as we have seen, bear no constant relation to the form or extent of obstruction. But since the obstructive symptoms are always associated with and are produced, either directly or indirectly, by the changes in the prostate, the exact determination by clinical methods of the character and extent of these changes is essential to the choice of appropriate surgical treatment.

Adopting the basis here given for classification, we recognize four distinct clinical types of prostatic obstruction:

1. The prostate distinctly enlarged per rectum (prostatic hypertrophy, prostatic adenoma). This is by far the largest group and includes all cases of unilateral, bilateral, or median lobe enlargement in which this can be made out by rectal examination. The diagnosis is confirmed by catheterization, and the size and character of the enlargement can be further determined by cystoscopy when necessary or advisable.

2. The small sclerotic prostate. Rectal examination reveals the absence of a large, soft, adenomatous gland. Instead, the prostate is hard, firm, resistant but elastic. The size may be slightly increased or it may be quite normal or even atrophic. Cystoscopy is apt to be more difficult than in the large adenomatous variety. The irregularity at the sphincteric margin due to small projecting lobes, the elevation of the urethral floor with the bas-fond behind, and the rectal examination with the cystoscope in place, make the diagnosis fairly easy.

3. Purely intravesical prostatic growths. These patients present the typical clinical picture of prostatic obstruction, but rectal examination reveals no enlargement or other appreciable changes in the gland. The diagnosis can be made only by cystoscopy. To this type belong the patients with wholly intravesical projecting lobes, either lateral or median; pedunculated lobes springing from the anterior commissure or lateral urethral margin; and small isolated adenomata involving Albarran's group of glands or prostatic glands at the sphincteric margin.

4. Retention without apparent mechanical obstruction or demonstrable cord lesion. This is the most important group from the standpoint of differential diagnosis. These patients present the typical characteristic symptoms of prostatic obstruction, but examination fails to disclose any changes in the prostate to account for the vesical retention. Guyon first called attention to this type of case and referred to the condition as prostatism without hypertrophy — "prostatism sans prostate." In the absence of apparent obstruction at the vesical neck, various theories have been proposed to explain the retention and other symptoms of obstruction. It is unnecessary at this time to review the various explanations which have been suggested. It is sufficient to point out that there is an increasing tendency to regard the vesical retention in these cases as due to two, and only two, causes; either an unrecognized mechanical obstruction or a nerve lesion involving the center controlling the bladder or interfering with its innervation.

Unrecognized mechanical obstruction. Evidence of a convincing character is accumulating which tends to support the view that in these cases of unexplained retention the underlying cause can always be found in either a nerve lesion or an actual obstruction at the vesical orifice, so slight in many cases as to be easily overlooked by the usual methods of examination, and in some cases recognized only by direct palpation of the vesical outlet through the open bladder. The three forms of obstruction so far met with in this type of retention are contracture of the vesical outlet (Keyes, Chetwood), median bar (Young), and minute peri-urethral adenomata (Marion, Catarro). To these I would add small intra-urethral projecting prostatic lobes. I have had under observation three cases of vesical retention in which rectal examination and cystoscopy failed to disclose any evidences of prostatic obstruction. The caliber of the urethra was undiminished; large sounds passed to the bladder with ease. Inspection of the posterior urethra showed

small well-defined prostatic lobes bulging into the urethra from the lateral walls and transforming the lumen into a vertical slit, quite as one sees in bilateral hypertrophy. The offending lobes certainly would have been overlooked in these cases except for the direct inspection of the prostatic urethra through the cystoscope during its removal. This examination of the posterior urethra should always be made when bladder cystoscopy fails to reveal an adequate cause for retention.

Nerve lesions. In every case of vesical retention without apparent obstruction the possibility of a cord lesion as the etiological factor must be considered. It is, I believe, a well-established fact that the first, and perhaps for years the only, symptoms of tabes may be those referable to the bladder, symptoms indistinguishable from those due to mechanical obstruction. In the absence of other evidence of the disease, the diagnosis has not been heretofore always easy to establish. At the present time, however, the newer aids to diagnosis—the Wassermann test of the blood and spinal fluid and the protein content and cell count of the spinal fluid—have made it possible to recognize tabes as the etiological factor in many of these obscure cases.

The point of practical interest in this whole matter is this: With the means at hand of more accurately differentiating between these two forms of retention, the indications for surgical interference become more clearly defined. In cases of retention due to a nerve lesion and uncomplicated by mechanical obstruction, any surgical operation will be fruitless and may be worse than useless. Experience in the last two years has shown that in the other types of obstruction, where the etiological factor is so often difficult to determine by our clinical methods of examination, and is at times impossible to recognize except through a cystotomy wound, appropriate operative procedures have given most brilliant results. To avoid unnecessary and useless surgery on the one hand, and on the other hand to give these hopeless cases the relief which surgery offers, demands a careful differentiation of these two forms of obstruction based upon accurate pre-operative diagnosis; and to do this may at times tax the skill and judgment of the most accomplished genito-urinary surgeon.

Surgical management. Success in the surgical management of patients suffering with prostatic obstruction depends, in the final analysis, upon a complete pre-operative diagnosis—with extraordinary emphasis upon "complete." Obviously, the first step is to determine the character and extent of the obstruction. Upon this data is based the selection of the appropriate surgical procedure according to the individual operator's experience and judgment. Equally important is the determination of the patient's fitness to undergo an operation and the necessity for, and amount of, preliminary treatment required to assure a certain and quiet convalescence. It is hardly necessary to consider here the detailed steps of the various methods of examination leading to a complete diagnosis. These necessarily vary in different cases and in different clinical types of obstruction. But one cannot too often insist upon the importance of a thorough, careful, preliminary study of each individual case as a basis for sound surgical judgment.

In the first three clinical types of prostatic obstruction enumerated above, removal of the obstruction by prostatectomy is clearly indicated. Whatever may be the cause of the vesical retention in these cases, removal of the obstructing prostate is followed by complete relief of retention and the other obstructive symptoms. The perineal and suprapubic operations have now been standardized to such an extent that the operative technique differs only in certain details in the practice of different surgeons. The choice of operation will depend upon individual preference.

I do not wish to raise the question or to discuss the relative merits of the two operations. But it is my belief that the suprapubic operation adequately meets the requirements in every case when a prostatectomy is indicated. In the adenomatous variety of prostatic enlargement the removal of the obstructing adenoma is easily accomplished. The small, adherent, sclerotic prostate is

the most difficult variety to deal with surgically. It is in this class of cases that the perineal operation is supposed to present distinct advantages, particularly if the patient is large and fat. These are without doubt the most difficult cases for a prostatectomy by either method. But I am of the opinion that these difficulties are technically just as great by the perineal route as by the suprapubic, while the functional results obtained by the high operation are likely to be more satisfactory in a larger percentage of cases. This, I believe, is due to the more thorough and complete removal of the dense fibrous tissue surrounding the vesical neck in these cases, which produces a relative stenosis and an elevation of the floor of the urethral orifice.

If the indications for surgical interference are clear in the first three clinical types of prostatic obstructions, the surgical management of the last group, namely, the case without apparent mechanical obstruction or demonstrable cord lesion, presents greater difficulties. As already pointed out, many of these cases without apparent obstruction do, as a matter of fact, present changes in or about the vesical neck which are easily overlooked by the usual methods of examination. That these changes are sufficient to account for the vesical retention is evidenced by the fact that appropriate surgical methods directed toward their correction is followed by a restoration of the normal bladder function.

Relative stenosis of the vesical orifice in the form of contracture, or a median bar, has been found as the most common pathological condition in these cases of obscure retention. With the bladder opened above the pubis, a rigid, unyielding, contracted orifice is felt on attempting to introduce the finger into the prostatic urethra. The urethral opening is often elevated a considerable distance above the trigone. In one case the stenosis was so extreme that with the bladder opened above the pubes we noted a decided blanching of the mucosa about the orifice from pressure on introducing an ordinary silver catheter. The stenosis was relieved by removing with electric cautery a wedge-shaped piece of tissue from the floor of the outlet extending completely through constricting ring.

The pathology of this form of obstruction is not well understood. The underlying pathological changes have not been sufficiently studied. And we are not able, therefore, to state definitely just what are the etiological factors responsible for these changes. Clinically, we recognize a stenosis of the vesical outlet in the form of a dense, unyielding ring of tissue, and it is generally assumed that these changes are inflammatory in nature and the result of a deposit of scar tissue. This assumption, so far as I know, is not based on any extensive histological studies. Additional study of a larger amount of material is necessary in order to clear up the question of the pathology of this form of obstruction and to aid us in the selection of appropriate treatment in individual cases.

In an important paper in the *Journal d'Urologie*, 1912, Marion has reported several cases of obscure retention in which the etiological factor was not demonstrable by the usual clinical methods of examination and was recognized only by direct palpation after the bladder was opened. He found minute peri-urethral adenomata to which he attributed the obstructive symptoms. The operative treatment employed by Marion, namely, the removal of the vesical neck, including the bladder sphincter, seems rather heroic; but the important point is that normal urination was reëstablished.

Bransford Lewis, in an admirable paper, has reported recently[1] a number of cases of obscure retention observed by him. In two cases "contracture" at the vesical orifice was demonstrated and normal bladder function restored by incisions and dilatations of the fibrous ring through a perineal cystotomy wound. Lewis, in common with many others, is "a partisan of the belief that urinary retention is occasioned by two causes only; namely, mechanical obstruction or nervous influences. If we do not perceive which of the two are in play, it is but an evidence of our human frailty in diagnosis."

In one case of intra-urethral prostatic adenoma I was led, for various reasons, to try fulguration in an attempt to relieve the obstruction. This was a very favorable

[1] Am. J. Surg., 1915, March.

patient, as he bore repeated instrumentations exceedingly well. The intra-urethral manipulations were difficult and tedious, but seven séances were sufficient to reduce a residual of three hundred cubic centimeters to zero, and all symptoms of obstruction disappeared. This patient has been under observation for one and one-half years, during which time there has been no return of his trouble. Encouraged by the results in this case, I tried fulguration in a second case of the same kind. The results were not so favorable. There was marked relief lasting eight months; then symptoms of obstruction recurred, and I was obliged to enucleate the obstructing adenomata through a suprapubic incision. Functional results, urinary and sexual, following the second operation have been perfect. The third case of intra-urethral adenoma referred to was seen in consultation. Operation was deemed inadvisable, and patient died in three weeks of uræmia.

Several operative procedures have been employed in relieving the obstruction in the group of cases now under discussion, varying with the character of the obstruction as determined by the clinical methods of examination, or palpation through the bladder. The discussion of the indications for and the results of Chetwood's cautery operation and Young's punch operation I leave to the distinguished authors of these operative procedures. Among the various other methods employed we may mention gradual dilatation, division with a knife or cautery and dilatation through a perineal cystotomy wound, excision of a wedge-shaped piece of the constricting ring through a suprapubic wound, removal of the vesical neck, including the sphincter, through a suprapubic opening, and fulguration. The operation of choice will of necessity vary with the character and extent of obstruction met with. Attention has been called to the need of further study of the underlying pathological changes in this form of obstruction as a basis for the determination of the best methods of dealing with each individual case.

CONTRA-INDICATIONS TO SURGICAL INTERVENTION IN OBSTRUCTION AT THE VESICAL NECK

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THAT surgical intervention is absolutely demanded in certain conditions of obstruction at the vesical neck goes without saying. Indeed, in many such conditions, for the practitioner to withhold it or discourage the patient from accepting it, is to deny him the opportunity of relief, contributing directly to both misery and mortality. But on the other hand, there are certain other conditions contributing to obstruction at the vesical neck that do not demand operative interference; and under such circumstances intervention of this sort should be viewed not only as meddlesome, but as harmful and without compensating features.

No matter how varied, apparently, the causation of urinary retention, it is believed by the writer that it always arises from one of two factors: physical obstruction of some kind or disturbance of the nervous mechanism controlling urination. Excluding the several forms and kinds of physical obstruction that habitually demand operative methods of relief, we have for consideration, as included in the retentions demanding non-operative methods, (*a*) those of congestive or inflammatory origin; (*b*) those of habit formation, and (*c*) those of cerebral, (*d*) spinal, (*e*) neurotic, (*f*) psychic, (*g*) reflex, (*h*) toxic, and (*i*) infectious (bacteriuria) causation.

a. Congestive and inflammatory retention. We have all observed cases of difficult urination or even retention of more or less severity and duration of the first classification, chiefly in connection with inflammatory swelling of the prostate with or without coincident hypertrophy; and we have seen these clear

up and resume normal ease and completeness of evacuation on the disappearance of the congestive conditions. In connection with so-called hypertrophy of the prostate, refined judgment is sometimes required to say just how much obstruction is dependent on the hypertrophy and how much on the inflammation. I have seen cases in which I misjudged conditions and later had to revise an estimate, acknowledging the lack of necessity for operation that had before seemed imperative. Time, and quieting measures affording physical and surgical rest, will usually solve the question where there is doubt.

b. Habit. Retention from a habit of unduly postponing urination, either because of modesty or from preoccupation, is said by certain observers to become serious and permanent (1). It has been reported as affecting teachers, clerks, and others of exacting occupation. While there is a difference of opinion as to the exact mechanism of producing this effect, there seems no doubt of its reality; and it is equally obvious that no operation is required for its relief.

c. Retention of cerebral or spinal origin. Layton (*ibid.*) remarks that partial or complete retention, for a variable length of time, is of more or less frequent occurrence in meningitis and myelitis, in the first stage of anterior poliomyelitis; it occurs early in some cases of either cerebral or cord hæmorrhage, and has been encountered in lateral sclerosis and in multiple sclerosis (2). All are familiar with the chronic retentions of tabes and spinal syphilis. It will hardly be claimed that any operative plan is appropriate for any of these; and yet, in a paper read by the writer a year ago before this association (3), it was related that several cases had been observed in which surgical assaults had been committed on just such cases, committed under the belief that they were cases of ordinary prostatic obstruction from hypertrophy or contracture or an indeterminate entity classed under the omnibus term "prostatic obstruction."

The lesson of these cases is to adhere more closely to refined diagnosis; and allow the diagnosis, correctly delineated, to dictate the character of treatment for each case. The Wassermann tests are of vital importance in doubtful cases, and, as previously pointed out (*ibid.*), will often throw a flood of light on a condition so obscure and mystical that it has been designated "unaccountable" by writers of note and large experience.

e. Neurotic. The retention of hysteria, of emotional storms (Layton, *ibid.*), of nymphomania, of fatigue (4), and masturbation have but to be mentioned to be excluded from operative methods of relief, except as they depend on some originating pathological condition that requires operation. They are practically in the same category as the next two classes, (*f*) psychic and (*g*) reflex, to which the same remark applies.

f. The psychic form of retention, that from the influence of a fixed idea, is occasionally met with. Aldrich (5) relates the case of a girl who could not urinate except in a darkened room; and of a boy who could not urinate in a darkened room, but had no difficulty when in the dark out of doors. It is obvious that such a condition presents no indication for operation.

g. Reflex retention. The urinary organs are a frequent prey to reflex nervous irritation, and its end-results are multifarious. An occasional one is urinary retention. Swinburne (6) mentions some interesting cases of this sort.

CASE 1. Patient had been operated twenty years before by a prominent specialist of that time (perineal section for supposed tight stricture). Ten days after going home, his condition was the same as before operation. Since that time he had been relieved by the use of sounds. On coming to Swinburne, the patient had four ounces of residual urine. Examination with the endoscope showed no narrowing and no stricture. A few applications of nitrate of silver through the endoscope relieved this to a considerable degree. At times the patient completely emptied his bladder, but if he went too long without treatment he had partial urinary retention.

CASE 2. Another case reported by Swinburne was that of a man 26 years of age, suffering from enuresis and having a residual of eighteen ounces. An inflamed posterior urethra was given as the reason. After application of silver through the endoscope to the verumontanum, the patient was greatly improved and had only eight ounces.

It is related that a surgeon prepared to operate by external urethrotomy on a case

of severe deep urethral stricture with marked impediment to urination. His orders included a brisk purge, which acted on the night previous to the time set for operating. The evacuations brought away a goodly number of ascarides vermiculares, the irritation of which in the rectum seemed to have been causing the urinary obstruction, as the latter was then found to be entirely relieved. The operation was not done.

Post-operative acute retention is a matter of frequent observation, both in men and women. This pertains especially to operations on the rectum or pelvic organs. Retention often follows parturition. It sometimes follows the administration of general anæsthesia, or the use of urethral instruments. The necessity of operating on a case of reflex origin depends on the primary cause of the reflected irritation. It may or may not require operation for relief. But at least it goes without saying that the retention deserves no direct form of operating for relief, and that therapy, whatever it is, must be directed to the original focus of trouble.

h. Toxic retention. Various kinds and forms of toxæmia evoke urine retention. The following are the more frequent: alcoholism, uric-acidæmia, uræmia, acidosis, diabetic coma, puerperal sepsis, febrile states (typhoid); chilling of the body (7). The toxic effect of drugs (cantharides, turpentine, phosphorus [8]) is very similar to the above and is well established. It will be noted that these are all causes of retention not demanding operation for relief.

i. Infectious retention. An exceedingly interesting condition, often producing retention in little girls, is that of bacteriuria. A fact that separates this from the inflammatory form, previously mentioned, is that it is effective for deleterious influence without any inflammation or suppuration being present.

The phenomena of bacterial infections of childhood have been studied by many in the past decade, notably Hirschsprung (9), Holt (10), Zahorski (11), Abt (12), and Joseph Brenneman (13). Following a colon bacillus invasion of the urinary tract a child may make no complaint, but may show marked indisposition and suddenly become unable to void urine naturally. Examination of the urine drawn by catheter finds it loaded with colon bacilli, but often without any pus. The kidneys may or may not be involved in addition to the infection of the bladder. Pediatricians say that such infection is shown in fully one per cent of children's illnesses. No operation is required in such cases unless accompanied by some pathological condition that must be remedied by operation; but internal and local antisepsis with regulation of diet and intestinal activity usually afford success.

Atony. Atony of the bladder and its connection with retention of urine have been discussed elsewhere (3) more extensively, but it may be here remarked that the weakening of the walls and detrusor muscles of the bladder is an entity that bears on retention in a definite and contributory manner. But the writer does not believe it occupies as important a position as is usually ascribed to it, or that it is irremediable, as often accredited. He is further of the opinion that its relief depends on the removal of its cause, the obstruction.

Other conditions, such as advanced or marked debility, are considered by some to preclude operation where it would otherwise be highly desirable or even life-saving. This assumption must be qualified. As a matter of fact, it is very seldom that old age in itself precludes operation. Many cases over eighty — some, even, up to ninety — have been operated on successfully for prostatic obstruction. While this factor is one that cannot be corrected by time, it is also one to which by far too much attention is given by friends and relatives, and often also by the physician in charge. It is a fact, established by large experience, that old men whose physical condition is fair tolerate anæsthesia and operation surprisingly well, if appropriate preparatory measures are fully carried out. Fortunately, the other factor, debilitated physical condition, is one that can be corrected in the great majority of cases by the various forms of preparatory treatment that have come into vogue of late years. An old gentleman who requires prostatectomy must be very far gone indeed, these days, to be

beyond reach of its beneficent influence. It is true that the presence of albumin and casts in the urine, or a valvular heart lesion, sound a note of warning, but they present no insuperable obstacle to surgical intervention. The heart can be given renewed activity, the kidneys can be supported and brought into healthier action and ampler functionation; and protectives with regard to the anæsthetic state for the performance of the operation are both numerous and efficient: so that it is only the most extreme cases in which operation must be denied on account of these conditions alone. Diabetes is a condition that is definitely forbidding to operative prospects, although cases are recorded of successful prostatectomies in the face of this condition. Still, it must be acknowledged that when this condition prevails, palliative measures that are at all successful should be relied on as far as possible, at least until the diabetes is brought well under control.

In discussing the contra-indications to operative interference in prostatic obstructions, it must be remembered that there are numerous cases of stenosis at the neck, received and detected early enough in their developmental period to permit of success in their treatment with dilating measures. This has been clearly proved in numerous instances in the writer's experience; and each case so proved is a living denial of the necessity of operation — in this particular case, at least.

Therefore, while we are ready to subscribe to the testimony of efficacy of operative methods of relief for obstruction at the neck, we must remember that many cases may be permanently relieved without operation, and that they have a right to a trial of the more conservative methods first; while in other cases operative methods are unjustified because of the physical and other conditions prevailing. Diagnosis and discriminating judgment should govern the situation.

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VESICAL OBSTRUCTION BY DISEASED SEMINAL VESICLES

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SINCE the seminal vesicles, enclosed in unyielding fascial envelopes, are closely bound to the base of the bladder, infections of the former may, and often do, induce lesions of the bladder-opening mechanism which result in partial or complete retention of urine. These lesions are —

1. *Acute infections of the vesicles, causing inflammatory swelling of the bladder neck;* the consequent inability to open the vesical orifice (like the inability to open œdematous eyelids) results in partial or even complete retention of urine. This sequence is familiar as a feature of acute gonorrhœa; the swelling of the bladder neck may result in complete retention of urine and compel the use of the catheter until the distended vesicle discharges its contents into the urethra, whereupon the œdema of the bladder neck rapidly subsides and the urinary retention ceases. This sequence of events is commonly ascribed to the formation and bursting of a prostatic abscess; that it is often due to a vesicular abscess has been repeatedly demonstrated in my clinic at Rush College, where the straining, distended bladder has been promptly relieved by washing out the infected vesicles through vasostomy, without any treatment directed to the prostate or bladder.

2. *Chronic infections of the vesicles, with chronic partial retention of urine.* Some twenty years ago, bilateral vasectomy was extensively practiced for the relief of bladder troubles which, because the subjects were elderly men, were ascribed, through lack of discrimination, to prostatic enlargement. Marked improvement amounting sometimes to permanent symptomatic cure with virtual disappearance of residual urine, was observed by many operators in a minority of cases so treated; some noted surgeons (Rovsing for example) reported equal success in a decided majority of their cases.

Yet we now know that occlusion of both vasa, whether through bilateral epididymitis or through surgical interference, has no appreciable effect upon the structure of the prostate, normal or other. Indeed, the only possible explanation of the abolition of residual urine in elderly men through vasectomy — which, like many others, I have personally witnessed — is the proved abolition of infection and distention in the seminal vesicles. To this innocuous desuetude of the vesicles, rather than to any effect upon the prostate, must be ascribed the improvement of the bladder function often achieved through bilateral vasectomy. That this operation must fail to relieve retention due to actual prostatic hypertrophy, is equally obvious.

3. *Fibroid induration of the bladder base and neck, resulting from perivesicular infections.* Our experience in the removal of obstructions to urination in elderly men comprises four stages: First, we recognized only the obvious mechanical obstacles, the prostatic adenomata; second, we learned that fibroid degeneration of the vesical orifice,

Primary carcinoma of seminal vesicle. Röntgenogram (retouched) of both vesicles filled with collargol solution a year before death, showing obliteration of upper part of cavity of diseased vesicle.

which exists with, as well as without, actual hypertrophy, is a frequent factor in chronic urinary retention; third, we learned through the practice of vasectomy that the obstacle to urination may lie in infections of the seminal vesicles; and, fourth, we are learning that through retrovesical infections the bladder may become permanently incapable of complete evacuation, even though no mechanical obstruction exists. Thus a man forty-two years old developed a severe infection of vesicles and perivesicular tissues, with complete retention of urine. Irrigation of both vesicles gave but slight relief. Six days after the initial chill, incision into the rectovesical tissue evacuated much pus (streptococcus and colon bacillus). Five years later the bladder retains four ounces residual urine, though no obstruction exists; and the rectovesical tissue feels like a scar.

4. *Primary carcinoma of the seminal vesicle* (diagnosis confirmed at autopsy) has caused in one case partial, in another complete, retention of urine. In the latter, operated at St. Luke's Hospital, no obstruction whatever could be discovered in the bladder or urinary exit; yet retention was complete until relieved by a suprapubic drain, inserted more than a year before death, which was due to metastases in the liver.

FREQUENCY OF RECURRENCE OF STONE IN THE KIDNEY AFTER OPERATION [1]

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AND
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FROM the point of view of the patient, the most interesting question after operation for stone in the kidney or ureter is whether or not the stone is likely to recur. A fairly careful search of the literature appears to show that this subject has not been highly thought of as a subject for study. We seem to have been chiefly interested, not in the probability of recurrence, but in the consideration of operative mortality, each vying with the other in a very proper desire to get a low mortality. Much space has been covered by discussions of technique, all proper in themselves, but leading to nothing if the prime end and object of the operation, cure of the patient, is not to be attained. I can find no useful statistics bearing upon this important question of recurrence after operation.

This is perhaps more easily explained if we remember that it is only within comparatively recent times that a diagnosis of recurrent stone could be made with accuracy. Our recent study has clearly shown that nothing short of a careful radiograph (and not that even in all cases) will make sure of the diagnosis. Very little reliance should be placed upon the statements of patients in regard to their health, and it is not even safe to assume that the opinion of the family physician is accurate. Quite a number of patients who have reported to us that they were cured, and a smaller number who have been reported by their physician as cured, have been shown by subsequent examination including X-ray to have recurrent stone, and the history was such as to lead us to believe that this stone has existed at the time of their previous examination. Not only in this question, but in most questions of late results, the statements of the patient should be taken with great caution, and we have been altogether too much in the habit of relying upon this form of evidence in reporting our results, to the ultimate detriment of the profession of surgery because we thus obtained credit for that which we could not in fact perform.

This paper is based upon a study, which we have been carrying on during the past year, of patients operated upon for stone in the kidney or ureter during the eight years previous to January 1, 1914. This date was selected because it excluded cases recently operated upon and because there was a fair probability that stone recurrence would have taken place in many if not most of the cases within this time were it going to occur. The cases are taken from the records of the Massachusetts General Hospital and were operated upon by the surgeons on duty. They therefore give a sound view of the results obtained by the general surgeon during that period and are not open to the criticisms that they are the results obtained by highly special and skilled operators. They may, we think, be taken to represent a fair average of the results obtained throughout the country. The list included 155 cases, but it was impossible to obtain actual presence in the clinic of more than 87, and our conclusions are therefore based upon the study of those cases. We have insisted that all the patients should come to us so that a careful physical examination, an examination of the urine, and an X-ray could be made. On nothing less than this are we willing to rely in reporting end-results.

We have recorded as cured those patients who presented a negative physical examination so far as the urinary tract was concerned, who had a urine normal on chemical and microscopic examination, and in whom the X-ray was negative. We recognize that there is a possible source of inaccuracy here, in that

[1] Read before the American Association of Genito-Urinary Surgeons, White Sulphur Springs, West Virginia, May 18–20, 1915.

the urine may be normal and the X-ray may be negative in the presence of stone in the kidney or ureter. But this combination, especially in patients whose calculi have previously been detected by the X-ray, is so unusual that we have been willing to disregard it.

Of the 87 cases thus carefully examined there were 66 cases of stone in the kidney and 21 cases of stone in the ureter. Roughly tabulated, the cases of stone in the kidney show that 34, or 51 per cent, were well, and 32, or 49 per cent, were not well. Of the cases of stone in the ureter 15, or 71 per cent, were well, and 6, or 29 per cent, were not well.

With this rather surprising showing of only slightly more than half the cases cured, it was interesting to see whether or not the type of operation was an important factor in the result. We have therefore divided them into the cases which were treated by nephrotomy, pyelotomy, or nephrectomy. Thirty cases of nephrotomy showed 13, or 43 per cent, well, and 17, or 56 per cent, not well. Of 33 cases of pyelotomy, 16, or 49 per cent, were well, and 17, or 51 per cent, were not well. Of 12 cases of nephrectomy, 11, or 92 per cent, were well, and 1, or 9 per cent, was not well.

It should perhaps be explained that in referring to the cases of nephrectomy as well or not well, we refer to the patient rather than to the kidney. We do not at this time intend to discuss whether or not a kidney in alcohol is to be regarded as cured or not. These cases of nephrectomy, however, are of some interest as bearing upon the question of whether stone in one kidney has any influence upon stone formation in the other. This series, of course, is too small to justify any accurate conclusion, but the fact that in only one case did stone occur in the remaining kidney after nephrectomy shows that there is some condition in the kidney itself which influences the formation of stone and which does not exist to the same extent in the opposite kidney.

There has been much discussion over the influence of infection upon the recurrence of stone. It is to be regretted that these cases do not enable us to discuss the point to advantage, as in most of them no cultures of the urine were taken before operation. It may, however, be pointed out that infection of the kidney is unlikely to produce any greater liability to recurrence of stone than to the primary formation of stone. The relation of infection to stone formation, if any there be, is still in the realms of discussion; but it is our present opinion that it is not a factor of overwhelming importance, for were such the case stone in the kidney would be far more common in the female than it is in the male, following the well-known fact that kidney infection is more common in women than in men.

In this small series of 155 cases there were 107 men and 48 women. Larger statistics appear to show that the probability of the occurrence of stone is about equal in men and women. We may, therefore, discount infection as a factor of great importance in the formation of stone.

In looking for further evidence on the question of the liability to recurrence and its causes, we tried to discover whether the length of time during which the stone had been in the kidney had any bearing upon this question. It does not, however, appear to have been an important factor. Thus of 8 cases with a history of less than one year, 4 cases recurred and 4 did not. Of 4 cases of about two years' duration, 2 recurred and 2 did not. Of 14 cases of six years' duration, 4 recurred and 10 did not; of 5 cases of about ten years' duration, 3 recurred and 2 did not; of 6 cases of fifteen years' duration, 4 recurred and 2 did not; while finally, of 6 cases of 20 years' duration, 3 recurred and 3 did not.

It would thus appear that the probability of recurrence in the cases of one year's duration is precisely the same as those of 20 years'. We seem to get nowhere by this line of inquiry.

Some interest does apparently attach to the age of the patient at the time operation is undertaken. Thus in patients of less than 35 the probability of recurrence is comparatively large, while in patients over 40 the probability of recurrence is comparatively small. This but follows out the well-known fact that the majority of stones in the kidney form during the period between 15 and 35,

and that after that age stone formation in the kidney becomes markedly less probable.

In attempting to sum up our results, it appears that we shall have to revise somewhat our rather optimistic views as to the results of operation for stone in the kidney. It has been clearly shown that the risk of these operations is not great. In our series of 155 cases there were 5 deaths, 2 following nephrectomy, and 1 each following nephrotomy, pyelotomy, and ureterotomy. Most of us have, I think, been in the habit of assuring the patient that the probability of cure is large. On the basis of these cases we can only say to the patient that the risk of operation is small; that the danger of progressive destruction of the kidney by the stone, if it is left, is large; that the probability of recurrence is considerable; that it depends somewhat upon the age, undoubtedly somewhat upon the method of operation and the skill with which it is carried out, but clearly somewhat upon the entirely unknown factor — the liability or the ability of that particular kidney to form concretions.

The outlook for the cases of stone in the ureter is apparently considerably better. In this small series of 21 cases, the probability of permanent cure seems to be about two to one.

SOME DETAILS IN THE SURGICAL TREATMENT OF TUMOR OF THE BLADDER[1]

By GEORGE W. WARREN, M.D., F.A.C.S., New York

ALTHOUGH in recently compiled statistics it is shown that the best results from treatment of bladder tumors are obtained by fulguration, I think surgical procedure eventually will be the method of choice. The history of the treatment of neoplasms in all departments of medicine has been first palliative and then radical surgical intervention with an aim to a cure. In cases of bladder tumor the inability to make a diagnosis of malignancy without microscopic examination is, to my mind, the reason for the popularity of the fulguration method. When the number of cases of simple keratosis and peculiar irregularities of the mucous membrane that have been treated by fulguration and reported as cured is considered, I believe statistics favorable to fulguration will not be shown.

To my mind, a cancer is a cancer no matter where situated, and treatment which has been a failure in one part of the body will not cure in another. As no one expects a cure by fulguration in cases of outspoken malignancy of the bladder, why expend so much energy upon a method granted to be efficient only in a small number of cases? If but one-half the energy and ingenuity displayed in devising electrodes and currents had been expended in perfecting operative procedures, statistics today would be far better.

In this brief paper I wish hastily to run over the points which, either by failure or success, have led me to believe them to be of surgical value.

There must be excision of the whole thickness of the bladder-wall at the region of the tumor. To do this, the bladder must be separated from the neighboring tissues at this point. In my experience, this is best accomplished extraperitoneally. If the skin incision is large enough and the patient put in the extreme Trendelenburg position, I have found no necessity for opening the peritoneal cavity. An unopened peritoneal cavity reduces the mortality from peritonitis. The bladder should be freed from the peritoneum and adjacent tissues only at the point of resection. When the tumor is situated near the trigonum, only one side of the bladder need be freed. When, however, the growth is located upon the back or upper portion of the bladder, the peritoneal cavity may have to be entered, as the peritoneum sometimes is adherent to the bladder overlying the tumor. The attachment of the urachus to the bladder has, as a rule, to be cut to permit free exposure of the bladder with a tumor thus situated. This cutting of the urachus opens the peritoneal cavity.

In all my cases there has been infection from the drainage tube which has involved more or less of the denuded area. This led me to free as little of the bladder as possible consistent with complete removal of the tumor. Normal perivesical fat allows far more mobility of the bladder than fat scarred by infection. Therefore the smaller the area involved in the separation of the bladder the better the mobility. The bladder should be well distended with fluid or air by means of a urethral catheter and not allowed to collapse during the separation, for rubbing of the bladder-walls together may dislodge a portion of the growth. After the bladder is freed it is allowed to empty itself as far as it will by the urethral catheter, which is allowed to remain in place during the separation. Open the bladder by a small cystotomy wound between guide sutures and remove the remainder of the fluid by aspiration, care being taken not to allow it to soil the freshly cut tissues.

I have found that in cases in which the growth has been handled or even touched there is grave danger of recurrence, which generally takes place at the site of the bladder wounds, often in the primary cystotomy incision. In one of my cases the growth was so heavy it broke from the bladder-wall during

[1]Read before the American Association of Genito-Urinary Surgeons, White Sulphur Springs, West Virginia, May 18-20, 1915.

removal and fell back into the field of operation, causing a recurrence in the perivesical space. This accident led me to design an instrument with which to clamp off these growths, thus isolating them before any amount of bladder resection was done. This cup clamp, I think, will be of value.

The growth is clamped off as soon as possible and through as small a cystotomy wound as is consistent with proper application of the clamp. This permits thorough cleansing of the bladder cavity and insures against small fragments of the tumor being left behind. The bladder may be painted with a solution which tends to kill any wandering cells of the neoplasm. To my mind, these small fragments of neoplasm and wandering neoplasm cells are the greatest cause of recurrence. Otherwise, why should there be so many recurrences in the primary cystotomy wound? Where ascitic fluid exists in cases of carcinomatosis, carcinomata can be induced in animals by injection of this fluid. Why should not the bladder fluid also be able to do the same in malignancy of this viscus?

As a rule, when the growth is situated over the trigonal area, the ureter is included in the bite taken by the clamp; and as the growth and bladder-wall are removed by cutting around the clamp, the ureter also is cut away. A pyelonephrosis has existed in some of my cases in which the growth was at the ureteral mouth. This pyelonephrosis persisted after operation, and is of grave import to the patient. Those cases in which the ureter has been stripped of surrounding fat and carefully sewed into the bladder-wall to insure against leakage are the ones in which persistent pyelonephrosis with stricture and retraction of the ureter have occurred. I now think it much better to do as little to the ureter as possible. It should not be stripped, but be disturbed from its bed as little as possible. With its adherent fat it should be replaced into the bladder at any point where it lies without tension and has a free end of at least half an inch beyond the bladder-wall. I use only one stitch to hold it in place and, if possible, this stitch is inserted not in the ureter itself, but in some tissue adherent to it. By these means it is hoped to have a more movable bladder with little retraction of the ureter.

It makes little difference how the bladder is closed. If the cut walls are held anywhere near each other they will heal. The amount of bladder-tissue removed can be very great, and the result, so far as bladder capacity is concerned, will be good. In cases where the growths are situated upon that portion of the bladder overlying the prostate, they are, in my hands, impossible to resect. There is a great chance that malignant growths so situated are adenocarcinomata with the mother-cells in the prostate. Cases of multiple vesical tumors do badly with partial resection of the bladder. If any surgical interference is to be undertaken, it is better to remove the whole bladder.

SUMMARY

If possible, use the extraperitoneal route.

The danger of recurrence from the soiling of the field of operation by the bladder fluid is greater than that from incomplete removal of the growth.

Too careful dissection of the ureter tends to ruin the results of transplantation.

INSUFFICIENCY AT THE URETEROVESICAL JUNCTION [1]

By HERMAN L. KRETSCHMER, M.D., F.A.C.S., and JAMES R. GREER, M.D., Ph.D., Chicago

CASES of dilatation of the upper urinary tract due to obstructive lesions are not uncommon, and when dilatation is found associated with one or another of these various lesions producing obstruction, there is no difficulty in explaining cause and effect. The lesions of the ureter met with under such circumstances may be found within its lumen, such as stones, stricture, tumor, kinks, etc., or the lesions may be found outside of the ureter, such as abdominal tumors, various uterine and ovarian tumors, pregnancy (?), and so on. Not infrequently the lesion exists farther down in the urinary tract, as for example in the prostate, vesicles, or urethra.

Marked dilatation of the urinary tract occurring ***without*** the presence of obstructive lesions and in the absence of lesions of the central nervous system are very rare, and up to the present time their pathogenesis is unknown.

The case we wish to present is considered worthy of report for the following reasons:

1. The rare occurrence of this condition.
2. The scarcity of case reports in the literature.
3. The obscure and indefinite factors mentioned in the case reports, as bearing on the etiology.

G. D. S., male, age 20; first seen November 28, 1913. In December, 1911, he passed a life insurance examination. The patient stated that in October, 1912, he was in a push-ball contest, three days after an attack of la grippe. Several days following the game, he felt tired and seemed unable to get rested. The physician whom he consulted at this time told him he had fever (102°) and that there was pus in the urine. This illness lasted about a week, during which time pus was continually present in the urine. The following spring he felt well enough to play baseball with the university team. At the time of admission there were no urinary symptoms, the patient seeking relief for the pyuria.

Physical examination. The patient is a well-developed and well-nourished young man, of light frame. Head and neck: eyes react to light and accommodation; movements normal; facial movements normal. Mouth: tongue protrudes in midline, no tremor; pea-sized polyp to left of raphe near tip; teeth in fair condition; throat slightly reddened; a few shot- to pea-sized glands on either side of neck. Chest: lungs negative; heart negative, no murmurs or thrills; pulse regular. Abdomen: liver, spleen, left kidney, right kidney (?), not palpable; inguinal glands pea-sized. Genitals negative. Extremities: Arm: epitrochlear glands on both sides are palpable. Leg: no scars, œdema, Babinski, or clonus; knee jerk present. Rectal examination negative. Blood examination: erythrocytes, 5,380,000; leucocytes, 11,200; hæmoglobin (Dare), 78 per cent; central nervous system negative. Because of the subsequent developments in this case, special examination of his central nervous system was made for us by Dr. James B. Herrick, who reported negative findings so far as any demonstrable lesions of the central nervous system are concerned.

Cystoscopic examination, January 3, 1914. There was a generalized trabeculization of the bladder. Internal urethral orifice negative. Both ureteral orifices were enormously dilated. Mild cystitis present.

Ureteral catheterization. The catheters passed all the way up into the pelvis of each kidney without obstruction. On one side two No. 6 catheters were inserted, and there appeared to remain room enough for two more. Pus was found in the urine from both kidneys. Pure culture of staphylococcus albus on both sides. Examinations for tubercle bacillus were negative.

Phenolsulphonephthalein test. First test: time of appearance, 21 minutes; total output, 61 per cent. Second test: intravenous injection: time of appearance, left side, 7 minutes; right side, 8 minutes; output, left side, 20 per cent; right side, 13 per cent (for thirty minutes' collection).

Urinalysis. March 15, 1914. Clear, amber, 1,012, nucleo albumin positive; serum albumin positive; sugar none. Microscopical examination shows the presence of hyaline and granular casts, erythrocytes, and leucocytes.

X-ray examination for stone was negative.

Wassermann test negative.

Because of the cystoscopic appearance of the ureteral orifices, a provisional diagnosis of bilateral dilatation of the upper urinary tract was made. It was then decided to verify this diagnosis by obtaining a pyelogram of both kidneys, which was carried out in the following manner: The patient was asked to void. Eight ounces of a 20 per cent solution of cargentos were injected into his bladder through a soft rubber catheter. The patient was placed in a prone position on the X-ray table. He was then asked to urinate, at the same time com-

[1] Read at the annual meeting of the American Urological Association, Baltimore, April 13–15, 1915.

pressing the urethra. After the patient's continued attempts to void with his urethra compressed, an X-ray picture was taken (Fig. 1). This shows that the cargentos solution has found its way into both kidneys, that the ureter is inserted at the lowest part of the enormously dilated kidney pelvis, and that both ureters are very much dilated. The right ureter and pelvis seem to be much more dilated than the left. A large amount of cargentos can be seen in the patient's bladder. Of interest is the ureteropelvic junction. The insertion of the ureter into the most dependent part of the pelvis excludes any local obstructive condition.

In a review of the literature at our command, we have found reports of sixteen similar cases.

CASE 1. J. B. Clark. Widow, age 50. Duration of illness, four weeks. Nocturnal frequency of urination. Some incontinence and cloudiness of urine. Cystoscopy: The right ureter was markedly dilated; the left ureter was dilated, but less so than the right. Diagnosis made by filling the bladder with collargol and allowing the same to find its way into the kidneys, as proved by the radiograph.

CASE 2. Bacharach. Female, age 27. History of urinary disturbance since early childhood. At the age of 15 had to strain for half an hour before she could get the urine started. Cystoscopy: Left ureter was slitlike in appearance; right ureter dilated. Diagnosis made by filling the bladder with collargol which found its way into the right kidney, and proved by radiograph. Treatment, nephrectomy.

CASE 3. Bacharach. Female, age 16. Up to the age of 14 the patient had had enuresis; since then has had difficult urination. Following a cold, she had burning on urination and turbid urine. At the time of her admission she was voiding once every ten minutes. For the past eight days she has not been able to void at all. Cystoscopy: Trabeculization of the bladder; marked cystitis; both ureteral orifices were enormously dilated. Collargol was placed in the bladder, and found its way into the kidneys on both sides, as proved by radiograph.

CASE 4. Israel. Female, age 32. After her first confinement she had frequency, hæmaturia, and bladder cramps. Patient had repeated attacks of bladder disturbances and finally developed pains in both kidneys. Cystoscopy showed dilatation of both ureteral orifices; right-sided nephrectomy.

CASE 5. Israel. Female, age 29. Left-sided renal colic, hæmaturia, pain in the bladder, and a more or less constant desire to urinate. Cystoscopy showed no dilatation of the ureteral orifices. Nephrectomy. (This case and the cases of Legueu and Papin are the only ones of the recorded cases in which the so-called "atonic dilatation" of the ureter was present without cystoscopic changes in the ureteral orifices and the bladder.)

CASE 6. Fedorow. Male. At the age of 14 he had had complete retention of urine. Removal of a stone by ureterotomy. At the age of 25, had attacks of right-sided pain, associated with hæmaturia. Cystoscopy revealed a dilated ureteral orifice. Partial resection of kidney and ureter. Sections of dilated ureter showed an absence muscle fibre.

CASE 7. Fedorow. Female, age 19. Three weeks after her last pregnancy the patient had attacks of chills, fever, and abdominal pain. Two weeks before admission, pain and swelling in the region of the right kidney. Nephrectomy.

CASE 8. A. Weiser. Post-mortem report. Male, age 20. The post-mortem report was as follows: Bilateral polycystic kidneys; enormous dilatation of both kidney pelves, ureters, and the bladder, without any obstruction. Both ureteral orifices easily admitted two fingers.

CASES 9 and 10. Voelcker. Two cases, both in women. These patients came seeking treatment for an existing cystopyelitis. Cystoscopically, the ureteral orifices were dilated. The bladder was filled with collargol, and the patients were asked to void; at the same time, pressure was exerted at the external ureteral orifice with the finger. The radiograph showed the entire urinary tract filled with collargol solution, due to insufficiency of the ureteral vesical valve.

CASES 11, 12, and 13. Legueu and Papin. These three cases were cystoscoped and enlargement of the ureteral orifices found. In one case one of the ureters was as large as a fifty-centime piece, and in the other two they were still larger. Collargol was injected into the bladder and a radiograph taken, and in the three cases the entire urinary system was filled with the collargol. In another case, in which the ureteral orifice was not dilated, collargol however appeared in the ureter.

CASES 14 and 15. Halle, in discussing the paper of Legueu and Papin, reported two cases which occurred in children aged 5 and 6 respectively.

CASE 16. Buerger. Male, age 8. Residual of four or five ounces, although micturition appeared normal. Cystoscopy revealed dilatation of both ureteral orifices. Dilatation of upper urinary tract proved by radiograph, after having first placed argyrol solution into the bladder, which found its way into the kidneys.

PATHOGENESIS

Four theories have been advanced to explain the occurrence of this condition:

1. Israel, in his report of similar cases, has used the term "atonic dilatation of the ureter." In his first case the dilatation involved primarily the ureters, the pelves being involved to a less extent. His explanation of the occurrence of this condition, without the presence of an organic obstruction to the urinary flow, is as follows: "He believes that dynamic causes can produce the same *Stau-*

ungserscheinungen as can organic causes. The dynamic *Abflusshinderniss* in this case consisted of the irritability of the bladder, resulting in frequent attempts to void, associated with a spasm of the sphincter. In spite of the intense pressing, only a few drops were voided, and at times nothing at all. As a result of these conditions there occurred a marked increase in the intravesical pressure, which occurred at frequent intervals and prevented a regular emptying of the ureter into the bladder. Israel believes that the cause of the entire process was due to an injury of the bladder, following a forceps delivery." In Israel's second case, atonic dilatation and elongation of the ureter were found at the time of operation, and he was unable to determine the cause therefor.

2. Fedorow explains the hydronephrosis in his first case as being due to atony of the ureter, which latter condition was called forth by *Stauungserscheinungen* in the kidney pelvis and ureter. All of these conditions were first manifest when the stone lodged in the ureter. That these conditions of stasis recurred is proved by the recurrent attacks of hæmaturia. As a result of this stasis there was a gradual disappearance of the muscular elements of the ureter and pelvis, which were replaced by scar tissue. Following this, the ureter and renal pelvis lost their elasticity and power through peristalsis to propel the collecting urine into the bladder. Lastly, complete atony of the ureter set in and the fluid could not be emptied from the hydronephrotic sac. In the second case, Fedorow explains the hydropyonephrosis as being due to the atony of the ureter and states that the atony is due to the stasis of the urine in the kidney.

3. Bacharach believes that in his two cases the primary cause of the atony of the ureter must have been a congenital insufficiency of the ureteral sphincter, rather than an ascending infection, which he thinks was secondary. Another factor by means of which his cases were differentiated from the others in the literature was that in both cases complete or incomplete retention was present, an occurrence which was not noted in the recorded cases. This, he believes, is a further argument in favor of the insufficiency of the muscular elements of the urinary tract. Halle believes this condition to be of congenital origin. Legueu and Papin believe that in their cases the cause of this condition must have been congenital, because their cases were young individuals and without any antecedent urinary trouble. In one case a stone was found which after removal proved to be of secondary formation. In one case an operation had been performed on the genitalia which preceded the urinary difficulty and which did not explain the condition.

In our case there was no history of previous urinary disturbance and no evidence to show that he had had any inflammatory condition in his urinary tract. Just prior to the onset of his trouble, he passed an examination for a life insurance. There was no history of trauma, such as was present in Israel's case. There were no urinary symptoms at the time of admission to the hospital.

4. Karoffa-Korbut, as a result of his animal experiments, believes that in some cases atony of the ureter is a result of an inflammatory process (ureteritis ascendens) and that it can lead to pyelectasia and hydronephrosis. This fact is questioned by Bacharach, who was unable to find any evidence of inflammatory changes in the ureter which he obtained by surgical operation.

Hagner of Washington, a short time ago, reported four cases of regurgitation of fluid from the bladder into the kidneys with ureteral catheters *in situ*, so that the collargol solution which had been placed into the bladder syphoned out of the ureteral catheters. Hagner believes that this phenomenon occurs only in chronic inflammatory diseases of the ureteral orifices and is produced by infiltration and cicatricial formation in this region, which causes a destruction of the valvelike arrangement in the normal ureteral orifices. With his views we are in perfect harmony. Regurgitation of fluid through diseased ureters has been recorded, and has also been seen after cases of nephrectomy for tuberculosis. It is obvious, therefore, that the cases described by Hagner do not belong to the group of cases under discussion.

DIAGNOSIS

In the cases reported prior to the advent of the pyelograph, the diagnosis was made at the time of operation (Israel, Fedorow). In all of the recently reported cases, the diagnosis was made by cystopyelography; that is, by filling the bladder with a solution of one of the newer silver salts and allowing it to find its way past the ureterovesical valve and on up into the kidney. Voelcker, as did we, forced the fluid into the kidneys by having the patients urinate against pressure. In most of the cases the condition was found present on both sides (Clark, Bacharach, Israel, Fedorow, Voelcker, Legueu and Papin, and Buerger in our case).

The method of filling the upper urinary tract by placing a medium opaque to the röntgen ray, such as cargentos, in the bladder and allowing it to flow into the kidneys was first used by Lichtenberg in 1909. This is the simplest and most accurate method for diagnosing this rare condition which we have at our command.

It has also been noted, clinically, that the cargentos solution can find its way into the ureter in cases in which the ureteral orifices appear normal when viewed with the cystoscope.

Figure 1. Shows the bladder distended with cargentos solution, which has found its way into both ureters and both kidneys. The ureters are enormously dilated, particularly on the right side.

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NOTE ON THE ANATOMY OF IMPERFECTLY DESCENDED TESTES[1]

By ALFRED C. WOOD, M.D., F.A.C.S., Philadelphia

THE testicles, originally in relation with the kidneys, opposite the first and second lumbar vertebræ, begin their descent during the second month of fœtal life. By the end of the third month they will have approached the anterior abdominal wall, where they remain until about the end of the sixth month. After evagination of the abdominal wall at the site of the internal ring, which is followed by the vaginal process of peritoneum, occurs, the sexual glands begin the final stage of their transit about the seventh month, and usually reach the scrotum shortly before birth (Piersol).

That this sequence of events is not invariably fully accomplished is well known. The descent may be delayed or may be arrested at any point of the normal course. Wrisburg examined 103 male infants at birth, and found both testicles in the scrotum in but 73 (70 per cent). Sach observed perfect descent in only 86 per cent of 143 male infants from one to four months of age. In the great majority of cases in which a testis is not apparent at birth it may be expected to descend later, in most instances in the first few days or weeks of post-natal life. As an indication of the tendency of these organs to reach their normal position, Coley's observations are very significant. At the Hospital for Ruptured and Crippled, of 18,410 male children under 14 years of age, applying on account of inguinal hernia, there were 561 instances of detained testes (3 per cent); of 3,848 boys between 14 and 21 years of age there were 92 cases (2.2 per cent); of 37,370 men over 21 years of age there were 75 examples (0.2 per cent). From these figures it appears that above the age of 21 years the proportion of imperfectly descended testes observed is less than one-tenth of the ratio between the ages of 14 and 21, and about one-fifteenth of that under 14 years. The numbers are sufficiently large to warrant their acceptance as a fair average; they show clearly that there is a very good chance of these detained organs reaching their normal situation up to the time of puberty, if not even later. These facts should be kept in mind when considering the reports of successful orchidopexies in early years.

From the foregoing it seems to me a distinction might be made between delayed descent, which could be called "detained," and permanent arrest or retained testis, the latter term being employed in the case of adults in whom further progress is not to be expected.

In view of what has been said, it would appear that, in the absence of complications requiring relief, operation might very properly be postponed at least until after the fourteenth or fifteenth year. The only argument for earlier interference is the impression, which seems more or less widely prevalent, that the organ will not develop properly if the descent has been incomplete, while growth as well as function will be stimulated if it is transferred to the scrotum. This view I believe to be based on insufficient premises. The tendency of these imperfectly descended organs to complete their evolution has been mentioned. When we read of a testis enlarging after orchidopexy it may well be questioned whether an equal degree of development might not have occurred without operation.

The retained testicle is associated with certain definite anatomical peculiarities to which I will very briefly refer.

1. As regards size and consistence, most authors state that the gland is abnormally small and that it is less firm than it should be. A few instances are reported, however, in which the retained organ was said to be normal in all respects. While I am not prepared to controvert this statement, I believe that if all of the cases were minutely examined such instances would be very rare. John Hunter held the opinion that the retained organ was never normal. Many others have

[1] Read before the American Association of Genito-Urinary Surgeons, White Sulphur Springs, West Virginia, May 18–20, 1915.

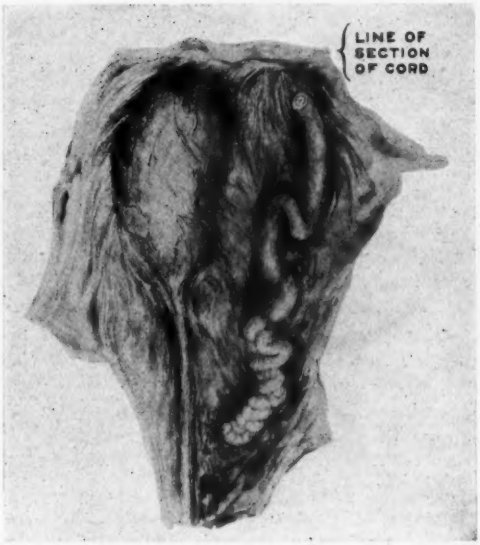

Fig. 1. Undescended (left) testis associated with left inguinal hernia. Epididymis absent; vas undeveloped. Upper margin of drawing represents line of section of cord.

Fig. 2. Undescended (left) testis; strangulation from axial rotation.

since expressed the same view. In this connection, important evidence has been furnished by the microscopic studies of several observers. This feature was especially emphasized in a valuable paper by Odiorne and Simmons.[1] While the appearances vary greatly in different cases, they state that careful examination will always show a marked deviation from the properly descended adult organ. The variations do not appear to have any constant relation with the exact degree of failure in transit or with the age of the patient. The important changes consist in an increase of fibrous tissue; the albuginea is thickened, sometimes very greatly so; the basement membrane of the tubules is thin; the perilobular connective tissue is increased; and the cells are of embryonic type. The "interstitial cells" are said to constitute a striking feature of these organs. Normally these cells are seen during childhood, but disappear about puberty. In undescended testicles the reverse is said to be true.

The following report of the microscopic appearances in one of the cases of this series is fairly typical:

"Section 'A,' through the vas deferens about one inch from the globus minor, shows a distinct lumen which is entirely empty of spermatic elements. The epithelium is more or less broken, irregular, and has at places evidently been proliferating into the duct in a papilliform manner. The mucosa and submucosa are very scant.

"Section 'B' shows a portion of the epididymis (globus major) and a part of the body of Highmore with a vasa efferentia. Here is seen a network of tubes of about the ordinary size, but in which the epithelial lining is decidedly altered. The cells are apparently too low, their cilia have probably not existed, and the cells are shrunken and wart-like. No distinct spermatozoa can be made out, but there is a finely fibrillated material in which little dots of chromatic substance are to be seen, which doubtless represent deteriorated spermatic elements. The epithelium in the body of Highmore is more typical, and apparently shows ciliation. The cells, however, are badly degenerated. Here again the same appearance of deteriorated spermatozoa is occasionally met with, but no clearly defined, well-preserved spermatic elements are visible.

"Section 'C,' globus minor with a small portion of testis proper. The tubes have the same appearance as in 'B.' They are atrophic. The reticular substance shows excess of intertubural tissue which is also atrophic. There is no spermatogenesis."

[1] Ann. Surg., Phila., 1904, xl.

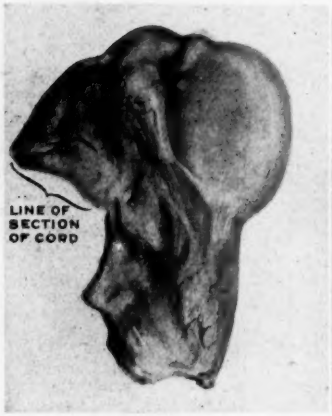

Fig. 3a. Undescended testis showing line of section.

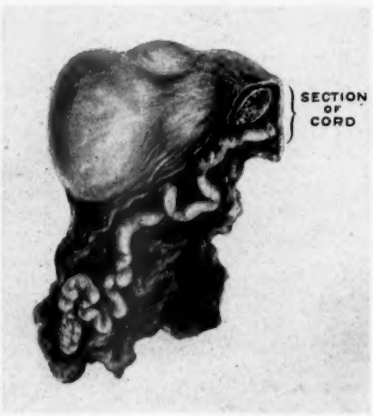

Fig. 3b. Undescended testis showing section of cord.

2. In addition to the underdevelopment, the undescended testis, although retaining the general form of the normal organ, does not acquire the usual relations to contiguous structures. The epididymis is not closely attached to the body of the gland, but is separated by a definite space. The common mesentery of the testis and epididymis, which is usually short and fixes these parts closely to the peritoneum, becomes elongated, forming a pedicle (Figs. 2 and 4). This elongated mesentery, with the unusual appearance mentioned, has suggested to some a resemblance to the ovary with the adjacent mesosalpinx (Bland-Sutton). It also appears to be a predisposing cause in the rotation and strangulation sometimes observed in cases of nondescent. This is, I believe, a better explanation than the suggestion of Owen, quoted by Bland-Sutton: "It is almost as if Nature herself, disappointed with her imperfect work, were anxious to cast it down a Tarpeian rock."

3. The vaginal process is unusually capacious, due to its reflection on the elongated mesentery. It not infrequently occupies its normal position in the scrotal pouch, even though the testis has been arrested in its descent. This condition has been well illustrated by Coley and others. It was a very prominent feature in my cases, of which the following is an example.

A man of 42 years presented himself with an incomplete right inguinal hernia, the corresponding testis being just within the external ring, never having been in the scrotum. At operation there was found a capacious vaginal and funicular sac which contained a little free fluid. The serous sac and the free end of the vas were well in the scrotal pouch and at least two inches below the lower border of the testis. At the internal ring the funicular process was tightly adherent to the cord, the communication with the abdominal cavity being entirely closed. Behind the testis, which lay in the canal, the bulging of the peritoneum and viscera was evident.

The funicular process is rarely obliterated in these cases, although occasionally, as in the one just mentioned, it may become closed off at the internal ring. This may be explained in part, at least, upon embryologic considerations. The vaginal process of peritoneum precedes the testis in its descent. The serous membrane covering the testis and adjacent parts, like that covering the abdominal viscera, never becomes adherent to the opposing serous surface except as the result of disease. When, therefore, the peritesticular peritoneum remains in the canal, a non-adhering surface is in contact with the funicular process and adhesion does not occur.

4. Inguinal hernia is very commonly associated with imperfect descent of the testis. Opinions differ in regard to the exact frequency of this complication, but it is stated

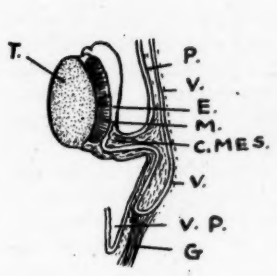

Fig. 4.

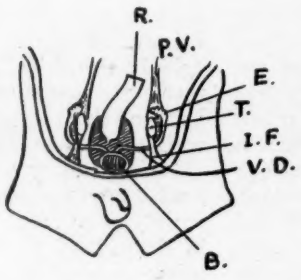

Fig. 5.

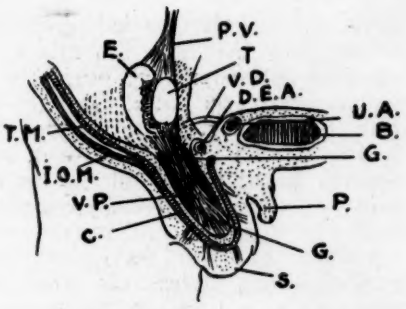

Fig. 6.

Fig. 4. Showing elongated common mesentery of testis. *t*, Testis; *p*, peritoneum; *v*, vas; *e*, epididymis; *m*, mesorchium; *c*, common mesentery; *v.p.*, vaginal process; *g*, gubernaculum. (Keith.)

Fig. 5. Fœtus of two and one-half months. *r*, Rectum; *p.v.*, plica vascularis; *e*, epididymis; *t*, testis; *i.f.*, inguinal fold; *v.d.*, vas deferens. (Keith.)

Fig. 6. Fœtus of sixth month. *p.v.*, Plica vascularis; *e*, epididymis; *t*, testis; *v.d.*, vas deferens; *d.e.a.*, deep epigastric artery; *u.a.*, umbilical artery; *b*, bladder; *p*, penis; *g*, gubernaculum; *s*, scrotum; *t.m.*, transversalis muscle; *i.o.m.*, internal oblique muscle; *v.p.*, vaginal process; *c*, cremaster. (Keith.)

to be from 60 to 70 per cent of all cases. A distinction must be made, however, between the actual presence of a hernia and the existence of a potential hernial sac. In a report of 126 operations for undescended testis, Coley states that he was able to demonstrate a hernial sac in every instance.

5. In addition to these more or less constant and obvious abnormalities, I wish especially to call attention to defects in the development of the epididymis or of the testicular end of the vas deferens. Very scant reference to this condition appears in recent literature, but earlier writers, among whom may be mentioned Follin, Cloquet, Godard, and Curling, reported such cases. A few years ago, in casually examining a testicle that had been removed during an operation for the cure of a troublesome hernia, it was apparent that the vas was not connected with the gland in the usual manner. The specimen was therefore carefully dissected, and the vas was found to terminate in a series of coils with a blind extremity which was not attached to the testis in any way. These coils appear to represent the globus minor of the epididymis. The case was reported before this society at its meeting in 1910 (see Fig. 1). Unfortunately, an opportunity for an autopsy presented later, and an unusual group of anomalies was discovered. The findings then reported may be briefly recalled: The left kidney was represented by a small tab of fibrous tissue and connected with the ureter by a minute fibrous band which seemed to have no lumen. The left ureter was represented by a thin fibrous cord. Careful examination of the bladder did not reveal any ureteral orifice on the left side. That on the right side was normal. The left seminal vesicle was enlarged and cystic, one portion projecting into the bladder on the left side. The remaining portion of the vas deferens was a short, coiled, blind tube six centimeters in length; the vas in this case, therefore, being deficient at both ends. All of the structures involved are derived from the wolffian body and duct. The particular combination of anomalies is readily explained by arrest in development of this fœtal structure.

Since reporting this case I have had an opportunity of dissecting five specimens of undescended testes. In four of these the condition of the epididymis was found to be practically the same as in the one just referred to (Fig. 3). While these cases are too few in number to form the basis of a definite statement, it is reasonable to conclude that this defect occurs more frequently than is generally recognized.

It is this last anomaly, observed in five of six cases examined, that led to these notes. An explanation of this condition is to be found in the embryology of these structures. The

testis and vas develop independently; the former with the vasa efferentia and coni vasculosi (globus major) originates in the genital ridge on the mesial side of the wolffian body, and the latter with the globus minor is derived from the wolffian duct, which is situated on the outer border of the wolffian body. The duct is originally closed at both ends, but as growth continues the testis and vas are joined by the development of intermediate tubes. When the cloaca divides into bladder and rectum, the lower end of the wolffian duct becomes connected with the prostatic urethra through the ejaculatory duct.

As the origins of the testis and vas are wholly distinct, arrest of the development of one does not affect the other, but both are frequently found abnormal in the same case, illustrating a more widespread cause than when one of these structures is deficient.

In Fig. 5, showing a two-and-a-half-months' fœtus, it will be seen that the testis and epididymis are quite distinct. At six months these two structures are coming into closer union (Fig. 6). In some of the specimens I have examined, the development appears to have been arrested at about this stage.

In those cases of imperfect descent in which the vas and epididymis (globus minor) are found in the scrotum, it has been suggested that the gubernaculum, which should be attached to the lower pole of the testis and to the epididymis and adjacent portion of vas, may have been deficient as regards its attachment to the testis. In such a case the epididymis would be drawn down without a corresponding descent of the testis. It might also be argued that on account of a localized peritonitis or other inflammatory action, the testis had formed unnatural adhesions which interfered with its normal evolution.

In the course of an orchidopexy, an effort should be made to determine whether the vas has joined the epididymis. As a rule these structures can be very well seen and felt through the peritoneal covering. If it is found that the vas has not united with the testis in the normal manner, an anastomosis with the globus major should be performed, according to the technique devised by Dr. Edward Martin in cases of sterility following epididymitis. This is particularly desirable if the testis contains spermatozoa, which may be determined by aspirating the globus major with a hypodermic syringe.

It will readily be recognized that the defective development in these cases assumes a variety of forms, as well as marked differences in degree, all of which depends upon the primary defect as well as its extent in each instance. This will explain, I think, the conflicting views held by different writers.

My endeavor has been to emphasize —

1. That failure in the descent of the testis is due to developmental defects that take place very early in fœtal life. The degree of the abnormality corresponds to the extent of interference in the formative period. As is well known, prior to the fifth or sixth week the sex characteristics cannot be distinguished. It has seemed to me that, in the condition here alluded to, the impress of the stimulus that determines the sex has been deficient, so that the change from the primary indifferent stage has stopped short of perfection.

2. As a consequence there are definite anatomical defects observed in connection with the testis which may involve other structures derived from the same embryologic source.

3. As the majority of detained testes reach the scrotum by the time of puberty, in the absence of complications that demand relief it would seem wise to postpone operations for transplanting the testis in the scrotum until ample time has been given the organ to descend naturally.

4. When operation is undertaken for any reason an effort should be made to trace the vas, and if it is found not to be connected with the testis an anastomosis may be performed, particularly if spermatozoa are present.

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CONGENITAL ECTOPIC KIDNEY AND HYDRONEPHROSIS ON THE LEFT SIDE, WITH A NORMAL KIDNEY ON THE RIGHT

With a Report of Case Showing this Condition

By ADDISON GORGAS BRENIZER, A.B., M.D., Charlotte, North Carolina

A YOUNG MAN, 21 years old, had always been in perfect health up to one and one-half years ago. At this time he passed through a siege of "intermittent fever" accompanied by pain in the left lateral inguinal and lumbar regions and over the left hip. Up to date he has had at least twenty-five similar attacks, except that the pain has grown worse and has been felt directly over the sacro-iliac joint and definitely in the lower lumbar and inguinal regions on the left side. These attacks of pain have all begun gradually, have become quite intense, and lasted from two days to a week, finally abating. The patient at last consulted a physician. The physician thought he felt a movable kidney deep down in the left side of the abdomen and measured the temperature at 102.4°. With the diagnosis of "movable kidney and kidney colic" the patient was brought to the hospital after several days. At the time he came to the hospital there was only the slightest pain and tenderness, there was no rise in the temperature even over a period of four days, and no certain mass could be felt through an abdomen which was held rigid. The urine, highly colored with methylene blue, contained only a few pus-cells. An X-ray picture showed no stone. The patient was in such good condition that he was discharged and asked to return, preferably during one of his attacks.

One month later the patient was brought back by his doctor and at this time was still suffering from the second attack since his first visit to the hospital. There was considerable pain in the back over the sacro-iliac joint, over the lower abdomen, in the inguinal region and the spermatic cord on the left side. There was tenderness over the left side and a resistance suggesting a mass at about the level of the brim of the pelvis. The urine contained a number of pus-cells. The temperature was 100° at three o'clock in the afternoon and rose to 102.4° by two o'clock the next morning. At the same time the pain became continuous and intense, necessitating morphine. The pain became less and less toward daylight, and the temperature fell to 99° and did not rise above this point during the next ten days. The urine passed in the morning was filled with pus-cells.

An X-ray picture had already been made during the first stay in the hospital and showed no stone. The ureters were catheterized four times during ten days. Each time the right catheter passed the ureter, but the left was halted about five inches up. One time a No. 7 catheter passed an inch or more higher, and its passage was followed by a free dripping from the catheter of a lightly purulent urine. The time of appearance of phthalein was six minutes on the right side and over twenty minutes on the left. The output was about one-fourth that of the right kidney. Bismuth catheters were inserted and another X-ray picture made (Fig. 1). In this picture the bismuth catheter is seen obstructed about five inches up the ureter and the end is carried over toward the midline just below the promontory of the sacrum.

There was clearly an obstruction of the left ureter at the point where the catheter stopped, and a resulting hydronephrosis. The obstruction was thought to be intra-abdominal and tuberculous glands were suspected, especially since there was present an indication of a mass; this was speculative.

The abdomen was opened through a left rectus incision, the patient put in the Trendelenburg position, and, with the intestines packed out of the way, a retroperitoneal mass lying over the region of the sacro-iliac joint was easily brought to view. On opening the retroperitoneal space and dissecting back the peritoneum, a thick walled cystic structure, covering the whole anterior aspect of the mass, was found. The mass, when opened, proved to be the much dilated and thickened pelvis of the kidney. This was continuous with a very short ureter, easily stripped down to the bladder. The ureter was cut and cauterized where it entered the bladder, and, beginning with the ureter below, the mass was dissected bluntly from below upward. As it was raised a triangular area of kidney-substance was brought to light; this occupied about one-fourth the space behind and above as compared with the three-fourths of the whole mass taken up by the pelvis. The main blood-vessels reached the kidney at the upper pole and coursed downward and inward on the posterior surface in a groove between the pelvis and the kidney-substance. The arteries were three or four small vessels derived from the aorta and the left common iliac.

Figure 1 shows the position and the outline of the kidney scratched on the X-ray plate. Figure 2 is a view of the anterior aspect of the kidney, showing the whole surface covered by the dilated pelvis. A small probe is passed up the ureter into the pelvis; a No. 7 catheter is admitted only on forcing. Figure 3 is a view of the posterior aspect of the kidney,

Fig. 1. Position and outline of kidney.

Fig. 2. Anterior aspect of kidney.

Fig. 3. Posterior aspect of kidney.

showing a triangular mass of kidney-substance at the upper pole. Four small straws inserted into the arteries indicate their course.

(1) The location of the kidney just over the brim of the pelvis is that reached in the ascent of the kidney at about the seventh week of fœtal life. (2) The anterior position of the pelvis is also that of the sixth to seventh week of fœtal life, before rotation in the transverse direction has taken place and before the kidneys become abdominal organs. (3) The ureter is very short and free from kinks and twists, its length being probably determined by the low level at which the kidney became fixed during its fœtal ascent. (4) The vessels are short, several in number; they enter at the upper pole and are picked up from the surroundings. (Dr. Jeidell, of the anatomical laboratory of the Johns Hopkins University, has shown that the capillaries of the kidney-bud probably communicate with the capillaries of the neighboring regions as the kidney passes upward. New capillary anastomoses are thus formed at the upper pole as it ascends, while those at the lower pole atrophy.) All these points in pathology of embryological origin point clearly to a failure to ascend, or, as it is wrongly spoken of, to a "congenital descensus."

The exact cause of the hydronephrosis is not clear. The opening from the pelvis into the ureter is very small and there was an abrupt angulation of the ureter on the pelvis. Just how this structure worked when filled with fluid under pressure, I cannot explain; much less can I explain why this condition lay latent and gave no symptoms for nineteen and one-half of the patient's twenty-one years of life, especially when it is considered that the primary condition began thirty-four weeks before the patient was born.

I am indebted to Drs. A. J. Crowell and J. W. Squires of this city—to Dr. Crowell for recatheterizing the ureters and assisting at the operation, and to Dr. Squires for the X-ray pictures.

OBSERVATIONS ON THE OPERATIVE TREATMENT OF SALPINGITIS[1]

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THIS paper comprises a series of 328 cases, and it has been my privilege to observe many more while at Rotunda Hospital and in the work of my seniors at the Wesley Memorial Hospital, the latter of which came previous to the greater part of my personal cases.

Etiology. The largest etiological factor in this series of cases was the gonococcus; from the history in some patients and vaginal smears in the others we found 197 instances where we felt certain of the diagnosis. There were 43 cases of puerperal origin, 35 of which followed criminal abortions, leaving 86 cases due to other infective organisms; examination of the pus removed from the tubes invariably returned a negative report. Four cases in this series were tubercular, although we had 3 others which are not included for reasons which will be given later. In 12 cases we found the appendix firmly attached to the right appendages, and in 5 of these we felt that it was the cause of the oöphoritis and cellulitis. Four cases were secondarily infected with the colon bacillus.

Pathology. The pathological range in salpingitis is very wide, there being, first, the chronic inflammation of the tubes and ovaries without pus formation; second, the cases of hydrosalpinx; third, those cases where the tubes are bulbous at the fimbriated end and contain a fluid thicker and denser than that of hydrosalpinx, but not of the thickness and consistence of pus, with the ovaries more or less cystic and enlarged showing evidences of inflammation; fourth, the cases of pyosalpinx of varying degree in which there is a moderate amount of destruction of one or both ovaries by abscess formation; fifth, the typical tubo-ovarian abscess with its complete destruction of the organs.

Adhesions play a very important part in the pathology of salpingitis and bring the organs into many different positions; the tubes become adherent posteriorly to the peritoneum, rectum, and uterus, and at times to each other — in several instances they were adherent anteriorly to the uterus and bladder — the tubes adhere to the ovaries and these in turn act as a plug preventing the escape of pus from the fimbriated end. The ovaries were adherent in all cases to the posterior parietal peritoneum and to the broad ligament where pus or a large cyst was present, and always adherent in other instances to the broad ligament.

In chronic salpingitis with little or no pus, the adhesions of the tubes and ovaries to the uterus, broad ligaments, and peritoneum were so dense that in most cases it appears as though the structures were grown together, and it is impossible to separate the ovaries from the broad ligament without tearing them or removing that part of the broad ligament where the attachment has taken place. In pyosalpinx and tubo-ovarian abscess, as a rule, a line of cleavage can be found making the separation quite easy, and furthermore the broad ligaments increase in thickness and density and can withstand a great amount of trauma without tearing.

The intestinal and omental adhesions differ largely in degree, the amount of intestine involved, and the density of the adhesions. We have had very little and easily separated bowel and omental adhesions to the uterus, tubes and ovaries, and bladder, and from this on up to the instances where it was impossible to separate the adhesions of a tubo-ovarian abscess without entering the bowel. In one of our cases there was a patulous opening between the bowel and abscess cavity. By far the worst adhesions were found after puerperal cases and usually between the ovarian abscess and the intestine.

In some cases the intestines and omentum become adherent to the fundus and anterior wall of the uterus and bladder and form an awning over the entire pelvic organs. The most destructive pathology follows puerperal infection, and in this the ovary is destroyed by abscess formation, probably due to the

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fact that the infection is carried directly to the ovary through the lymphatics and attacks it with its full intensity, and by the germs themselves, while with ordinary salpingitis the drippings of pus from the fimbriated ends wash over the ovary and cause an inflammatory reaction which results in cyst formation rather than abscess. Where the bacteria reach the ovary through the tube and do not cause pyosalpinx they do not, as a rule, produce ovarian abscess. Secondary infection with colon bacillus adds to the pathology in that it increases the peritonitis greatly and lowers the resistance of the tissues markedly. Fibroids occurred in 9 cases. There was one double dermoid of the ovaries. There were no cases of ruptured pus tube in the acute stage.

The appendix was attached to the right appendages on twelve occasions, in seven there was a marked salpingitis, while in five it appeared as if the appendix caused the infection and abscess on the right side, because the left was apparently normal. We make the above distinction, feeling that salpingitis is always double, and although the appendix was attached in seven instances it was not the etiological factor, the inflammation of the appendix following its attachment to the ovary or tube.

TREATMENT

All operations were performed after thorough subsidence of the acute stage. We have divided the cases under consideration into two groups; first, 161 in which the tubes, ovaries, and uterus were removed either by panhysterectomy or supravaginal hysterectomy. In the latter we amputated down to the vaginal wall, leaving as little of the cervix as possible. In this group of cases the pathology of the tubes and ovaries demanded their complete removal, and from my experience I am convinced that a supravaginal hysterectomy is a justifiable procedure in these cases. Panhysterectomy was performed in 19 cases, where the cervix was large and soft and in tuberculosis of the organs. The ultimate results were no better than a supravaginal hysterectomy, so we would not recommend it as a routine procedure.

Of the second group comprising 162 cases, various operations were done, namely:

Both tubes removed in all cases. In addition to this, in four the ovaries were removed and the uterus left; in 11, the uterus and one ovary were removed; in 36, the uterus and both ovaries were left, in 6 of which the ovaries were left *in toto*; in 21, one ovary was resected; in 9, both ovaries were resected. In 111 cases the uterus and one ovary were left, and in some of these the ovary was resected slightly or very small cysts were punctured; of these there were about 40. The 5 cases caused by the appendix, the appendages on the right side were removed in 4, and in 1 a supravaginal hysterectomy was done. Owing to the presence of fibroids in the uterus, the ovary on the left was not removed.

In operating on above group of cases our chief concern at the time of operation was what to do with the ovaries. In all cases both ovaries were affected to more or less degree; both were cystic or adherent to the tube or broad ligament with or without cyst formation. In some instances after freeing the ovaries from adhesions they looked to the naked eye comparatively healthy. As stated before we believe salpingitis is always double, still not two tubes in the same individual are exactly symmetrically affected as we see them on the operating table, and the same is true as to ovaries; if one ovary is plainly diseased from the salpingitis so is the other, although macroscopically it may appear in good shape either as a whole or in part; and although the source of infection be removed it does not follow that the infection has been removed from the ovary. We may therefore reasonably expect cystic degeneration in the ovary that is not badly affected at the time of operation. Many cases present themselves in which both ovaries are affected to some extent by the infection, and the problem is whether to leave one ovary or a part of one to preserve menstruation and other functions. It is a hard guess to say which one is less likely to degenerate and become cystic or have abscess formation. In our experience a goodly number do become cystic and require further operative work, and

this in a comparatively short time — some as early as 6 months and so far never longer than 3 years. Those who do not return to us for a second operation are not necessarily cured.

Of the above group of cases which were treated with the object in view of saving as much as possible of both ovaries, forty-four cases have returned to us in which the subjective symptoms and objective findings warranted a second operation. The main subjective symptoms were a continuation of the pain in one or both sides, menorrhagia and dysmenorrhœa, and persistence of the leucorrhœal discharge. These symptoms, coupled with the finding of a mass on one or both sides of the pelvis, showed a recurrence of the disease in the ovary or ovaries, the leucorrhœa of a large amount showing that the infection still persisted in and about the uterus. At the primary operation in the 44 cases, both tubes were removed in all, one ovary and uterus left in 24, both ovaries and uterus in 18, and the uterus alone in 2 cases. At the second operation in all but 4 the remaining ovarian tissue was removed with the uterus (supravaginal hysterectomy). In 4 cases resection of one ovary was done and up to date two of these have had their third operation. One of these cases had a persistent abdominal fistula from a resected degenerated cystic ovary which was left deep in the pelvis, the fistulous tract persisting for 5 months. One other case had a fistula for 8 months from a degenerating ovary after both tubes, uterus, and right ovary were removed, this occurring after primary operation. Another case died of peritonitis after secondary laparotomy, where there was a secondary infection with colon bacillus of both ovaries and uterus. A number of cases are at present under observation which have been operated but which are anything but cured of their pelvic disease.

We have found that a resected ovary or one that has required considerable manipulation to free it from its adhesive attachments is in the great majority of cases a constant source of pain to the patient and is very prone to become cystic and degenerated. Leucorrhœa is one of the most prominent symptoms we have to deal with, and very little improvement has been noted in this condition unless a supravaginal hysterectomy has been done.

Respecting fully the opinions of many authors as to the importance of the ovary, we have not taken the stand whereby the ovaries should be removed in all cases of salpingitis; on the other hand, a large percentage of those ovaries which in former years we left wholly or partially intact are now removed, and this radical treatment is really the most conservative one, as it does away with the possibility of a second laparotomy and its inherent dangers, the latter being a very large price to pay for six months to three years of menstruation; furthermore, the patients are not well in the interval between the first and second operations. The physiology of the female generative organs is so regulated that menstruation occurs from puberty to the menopause, or during the so-called childbearing period of a woman. Cases have been reported where conception has taken place before puberty, and when the woman is still in the menopause; but with anatomical conditions present which absolutely prohibit the union of the ovum and spermatozoa, these exceptional cases are not to be considered. We are perfectly secure, then, in our statement that when a woman reaches the climacteric she becomes automatically sterile. What effect normal menstruation has on the general health and physical welfare of a woman cannot be answered for the adult, while for those still in the adolescent period some serious consequences result from an early oöphorectomy. Since the physiology of the female generative organs is so controlled that when a woman reaches the age beyond which she cannot safely bear children the process of menstruation ceases, then why not assume that if for any just cause a woman is rendered sterile through a necessary operative procedure, she be placed immediately into the menopause by removing both ovaries, eliminating any chances for the development of future cystic condition; by removing the uterus, thus eliminating any possibiiity of a chronic endometritis, the means by which the infection no doubt reached the fallopian tubes; and by removing the possibility of a mere postponement of

the cessation of the menses? The diseased ovaries surely must have their functions impaired, and if the condition is very severe or of long standing the constitutional symptoms attendant upon the menopause or double oöphorectomy have been going on during the course of the disease, and plus this the symptoms due to the infection of the pelvic organs with the toxæmia attending such a condition, must be greater by far than the effect of the removal of the ovaries. The patients upon whom oöphorectomy has been performed are infinitely better than before the operation, not taking into consideration the immense improvement locally in the pelvis.

The above statement regarding the impaired function of the diseased ovary is made, knowing full well that many women have become pregnant and have menstruated with ovaries that contain neoplasms of all kinds, and also after the ovaries have been resected. If other diseased organs of the body have their functions impaired, can we make an exception of the ovaries? And other organs are removed *in toto*, provided they are not essential to the very life of the patient. Saving the ovary for pregnancy is entirely eliminated in the subject under consideration, and this brings us down to menstruation. The fact that they did not menstruate disturbed our patients mentally very little, and they easily became reconciled when the facts were put before them and they understood the situation. Some patients who thought favorably of pregnancy were satisfied when it was explained to them that although menstruation was preserved they could not become pregnant. With another class of patients they were happy with anything that excluded the possibility of pregnancy. We have been agreeably surprised at the small number of patients who after their operation complain of nervous symptoms which might be attributed to the removal of the ovaries; the nervous phenomena of menopause far exceed the above in duration and severity and yield far less readily to treatment.

Operative treatment. Every operation is started on a line of procedure which we have systematized, and this plan is carried out with such little deviations as the individual cases may demand. With the patient in the Trendelenburg position all operations are done through a median abdominal incision, large enough to give a good exposure to the field of operation. The incision starts at the pubes, the muscle and fascia being incised down to the bone, the loose intestines are pushed back and the upper abdominal cavity protected as much as possible with a five-yard roll of gauze. The campaign is at once directed to the uterus with the idea in view of exposing it thoroughly and freeing it of all its adhesive attachments anteriorly and posteriorly, the latter down to the cul-de-sac. It is very important to separate the adhesions on the posterior wall of the uterus thoroughly until one has exposed the cul-de-sac. The uterus is grasped as soon as the fundus is seen after opening the abdomen, and during the operation traction is made bringing the operative field up out of the cul-de-sac. Following this the intestinal and omental adhesions to the tubes and ovaries are dealt with; the intestinal ones are carefully separated if possible, the omental adhesions are separated or cut and ligated. The tubes and ovaries are brought out of the pelvis by working upward and outward posterior to the uterus, and starting from the lowest point of adhesion and keeping close to the tumor mass. Where the intestinal adhesions are so dense that they do not separate readily from the mass, the tube and ovary are separated from the uterus and other structures and brought outside the abdomen, thus giving more freedom of action. In nearly all cases the separation is accomplished without injury to the bowel. If there was a possibility of entering the bowel, the mass was cut away, leaving as little as possible of the abscess-wall attached to the intestine. Adhesions between loops of intestine were not disturbed unless there was evidence of a possibility of obstruction. In dealing with the pathology where the uterus was left, the tubes were removed by clamping off the broad ligaments as nearly parallel to the tube as possible; if the ovary was included the clamp was placed below it. All raw surfaces were covered by pulling up the infundibular pelvic ligament and the round ligament, the latter being shortened —

a great aid in keeping the uterus antiflexed. This method of covering the raw surfaces also has the tendency to prevent the prolapsing of ovaries that are left. One catgut suture is used on each side to replace clamps and cover the raw surfaces. When a hysterectomy is done the round ligaments are clamped, cut, and tied about one-half inch from the uterus; the bladder-peritoneum is dissected away from the uterus; the broad ligaments are clamped, saving as much of them as possible. With one double strand of No. 1 catgut, about 30 inches in length, we replace all clamps and cover up the raw surfaces; two knots are tied, the first after ligating the broad ligaments and the second after covering up. Our method of dealing with the round ligaments and bladder-peritoneum allows us to bring the cut ends of the round ligaments together in the center of our field, and gives us an abundance of peritoneum to be used in covering over raw surfaces without putting any tension on the structures that are used in the process.

The modified figure-of-eight suture, described by Dr. Watkins last year in a paper before this society, is the basis of all our suturing and makes the method used in the hysterectomy possible. If an ovary is left we believe it is best to leave the uterus in its entirety, because the ovary is thus left in a more normal position, where the circulation is less likely to be impaired and where the resistance is kept up to normal standards. In this position, should it require removal later on, the operation is far more simple and attended with less trauma and danger than if it were situated deeper in the pelvis, where it would become imbedded under the broad ligament and surrounded by dense adhesions. Resected ovaries were sutured with fine catgut on fine needles and with as little trauma as possible; small cysts were punctured with a Hagadorn needle, there being a possibility that the handling and suturing may be a factor in causing these ovaries to become cystic. When pus was spilled in the pelvis, drainage was obtained by packing the cul-de-sac with a gauze strip which was brought out through the vagina by incising the cul-de-sac from below after the abdomen was closed. Drainage through abdominal incision was never used. We consider the pus in these cases practically sterile, where no bad odor exists, but still drained because we felt there would be less reaction to the patient and because drainage insured a quieter convalescence.

After the operation the pelvis was never treated with antiseptic drugs, and nothing was done to prevent adhesions, except that the most careful technique was used in covering the raw surfaces and in leaving the intestinal adhesions alone, as stated before in this paper.

In tubercular salpingitis our results have been very unsatisfactory, though at the time the cases impressed me as being favorable ones for operation, judging from the pathology present and the general condition of the patient. Of the four cases operated upon not one is living; one who did not rally from the effects of the operation, died four days after; one died in six weeks, having developed a fæcal fistula; one in six months, the abdominal wound draining profusely the whole time and the patient remaining continuously in the hospital. The last one, a very favorable case apparently, early in the disease, left the hospital in three weeks in excellent condition but died eight months later from a tubercular meningitis.

In our last three cases we have, after opening the abdomen and noting the condition present, simply removed tissue sufficient for laboratory work and then closed the abdomen. This attitude is not assumed after a series of four cases which I personally operated on, for my observations extend a good deal beyond that. One of the last cases is living and doing quite well and it is upward of two years since the diagnosis was made. I have lost trace of the other two cases.

Cystitis occurred in a number of cases, but was of little consequence and readily responded to treatment. Several of our cases had acute attacks of colitis from 2 to 4 weeks after operation, which were severe enough to confine them to bed for a week to ten days, some returning to the hospital. The symptoms were severe colicky pains in the lower abdomen, frequent stools containing mucus and blood, with a slight rise of temperature.

Thrombophlebitis occurred in two cases and in both the condition was confined to the left leg. The swelling and œdema came on rapidly, reached its height in about eight days, and the whole limb was involved. This prolonged the convalescence for three to four weeks and it required months for the limb to return to its normal size.

Three cases returned to us with ventral hernias, two of which had wound infection and suppuration, and the third had primary union. This case was operated upon for the hernia, and on removing the skin stitches on the eighth day the wound opened exposing the intestines, necessitating re-suturing. The original catgut suture still held, but the fascia split the whole length of the right side of the wound where it had been punctured in putting in the catgut suture.

There were three deaths, not including the tubercular cases. Death was due to peritonitis. In two there had been a secondary infection with colon bacillus upon old gonorrhœal tubes. One case died sixty hours after the operation, from peritonitis. This case was not under observation before operation, but was represented to me as an old chronic case. I have always felt, however, that she was having a very acute attack at the time, judging from the conditions found at the time of the operation.

The prognosis as to the life of the patient impresses me as being very good in this condition, especially if one waits for the acute symptoms to subside, waiting at least eight days after the temperature has returned to normal before operating. In tubercular salpingitis the prognosis is not good for a cure of the condition or the life of the patient. For resected or whole ovaries that are left, the prognosis should always be very guarded as they are very prone to be painful and become cystic and require further operative work. Salpingitis severe enough to demand operative interference should include an oöphorectomy and supravaginal hysterectomy.

I wish to thank Dr. Payson L. Nusbaum for his assistance in the pathological work and development of the operative technique.

DEPARTMENT OF TECHNIQUE

A VACUUM APPARATUS FOR SUPRAPUBIC DRAINAGE

By EDWIN G. DAVIS, M.D., Baltimore
Resident Surgeon, Union Protestant Infirmary

By means of the apparatus described below, the urinary drainage following suprapubic cystostomy is disposed of, the patient being kept entirely dry and the necessity for frequent changes of dressings and bed linen being obviated. The principle of the method involves the production of a slight but constant suction within a catheter in the bladder, by means of a vacuum bottle, which is allowed to become exhausted very gradually and which is taken from the bedside and renewed when necessary. The vacuum bottle is connected by a rubber tube to an air-tight urine bottle, and the latter, by a second piece of tubing, to a catheter in the bladder. Between the two bottles is a regulator, which permits but a very small stream of air to leak into the vacuum, thus gradually exhausting the air in the urine bottle and making the pressure there slightly below atmospheric pressure. This produces a mild suction within the catheter in the bladder, and the urine is drawn out and drips down into the urine bottle, replacing the air which has leaked into the vacuum.

Two bottles are necessary, an eight-liter vacuum bottle (V) and a two-liter urine bottle (U), each provided with a two-hole rubber stopper and with pieces of glass tubing of a shape as shown in Fig. 1. Catheter (C), in the end of which are multiple perforations, is inserted into the bladder through the suprapubic incision, and by rubber tubing is connected with bottle U, which in turn is connected with bottle V. The catheter is held in place by strips of adhesive upon the abdomen, and the tube is supported by a safety pin and adhesive as it passes over the edge of the mattress. A sudden rush of air from U to V, with a consequent immediate exhausting of the vacuum, is prevented by the capillary regulator (CR), which hangs suspended within V, and which is shown in detail in Fig. 2.

The capillary regulator is made up of the following parts: The outer protecting sheath is a glass tube about 10 cm. long and about 1 cm. in diameter, with a constriction at the middle, as shown in Fig. 2. At either end is a rubber stopper held tightly in with a screw cap, as it would otherwise be forced out by the air pressure. Passing through each rubber stopper is a short piece of glass tubing, the lower one of these being drawn out to form an exceedingly fine capillary tube (CT). The air, coming from U, first passes through the tightly packed cotton plug (F), where it is filtered, and then it slowly forces its way through the capillary tube (CT), and on into the vacuum. The success or failure of the entire apparatus depends on the caliber of this delicate hairlike tube, the lumen of which is too small to be seen without the low power of a microscope. This minute opening regulates the air-flow, permitting but a very gradual leakage of air from U to V, so that a slight but constant suction is kept up within U, by means of which the urine is drawn through the catheter and rubber tube and slowly drips into the receptacle. In place of the outer glass tube shown in Fig. 2, the glass barrel of an antitoxin syringe may be used temporarily, a cotton plug being glued in the upper end and the rubber stopper and capillary tube being secured by adhesive in the lower end.

METHOD OF RENEWING VACUUM

The vacuum bottle may be disconnected at joint (J) and the vacuum renewed when necessary, the air being exhausted through stop cock (SC) by means of an ordinary hydraulic suction pump or filter pump such as is possessed by most hospitals and laboratories. These pumps are very simple and may be cheaply purchased with an attachment to fit on any faucet (see Fig. 3). The vacuum produced in an eight-liter bottle by running the water through one of these pumps for about four minutes will last from twenty-four to thirty-six hours, provided the capillary tube is the proper size. When the air has been exhausted from the vacuum bottle, the latter is carried to the bedside and attached to the urine bottle and need not be touched for at least another twenty-four hours.

Fig. 1. Entire apparatus in position.

Fig. 2. Capillary regulator.

Fig. 3. Suction pump.

Indicator (I), shown in Fig. 1, is a short piece of thin-walled rubber tubing attached to the Y-tube in the stopper of the vacuum bottle and plugged at the other end. This is collapsed by the outside air pressure when a vacuum exists, and bends over, but when V becomes filled with air the tube becomes distended and stands erect, indicating that a renewal of the vacuum is necessary. The remainder of the rubber tubing used on the apparatus should have walls of sufficient thickness to withstand the air pressure.

METHOD OF MAKING CAPILLARY TUBE

As stated before, the exact size of the capillary tube is all important. Too rapid a leakage of air from U to V would not only make frequent renewals of the vacuum necessary, but would cause a dangerously violent suction within the bladder. On the other hand, too mild a suction would permit drainage of urine over the abdomen. The making and testing of these tubes is a rather difficult, complicated procedure, and is impossible unless one devotes to it considerable time and careful attention. Arrangements have been made to put the apparatus on the market, but I include, nevertheless, a description of the method for anyone who may wish to attempt it.

First, a piece of glass tubing is drawn out to a point, and then this point is redrawn once or twice until a fine flexible hairlike thread, with no visible lumen, is obtained. In doing this the attempt should be made to make the tube as fine as possible. The next step is to determine and regulate the rate of air-flow through this minute lumen, which is done by drawing a stream of air through the tube and causing the air to pass through water, the number of bubbles per minute being counted. In making this test a large vacuum bottle, in the bottom of which there is water to a depth of about 10 cm., is used. A long straight piece of glass tubing passes through the rubber stopper and down to the bottom of this vacuum bottle, the lower end being therefore about 10 cm. under water. To the upper end, which extends out of the bottle, is attached, by a short piece of rubber tubing, the large end of the capillary tube which is to be tested. Air entering through the capillary tube must then pass through the water on its way into the vacuum, the rate being determined by counting the number of bubbles per minute. Since the rate of air-flow varies widely with the strength of the vacuum, I have taken as a standard a vacuum that will sustain a column of mercury 60 cm. in height.

Therefore, in order to standardize the vacuum, it is necessary to have it connected with a simple mercury manometer, consisting of a dish of mercury and a perpendicular glass tube about 75 or 80 cm. in height. The caliber of capillary tube that will give satisfaction has been found to be one that will permit about 70 or 80 bubbles per minute to pass through a depth of water of 10 cm. into a vacuum that will sustain a column of mercury 60 cm. in height. One can easily make the capillary tube too small; that is, so that the rate of air-flow is perhaps only 10 or 20 bubbles per minute. Then small bits may be snipped off the delicate tip with a pair of scissors, the increase in rate of air-flow caused by this being carefully watched until the proper number of bubbles per minute is obtained. The capillary tube, having been tested, is now fitted in a hole in a rubber stopper and is ready to be permanently inserted in the protecting tube, as shown in Fig. 2. The cotton filter (F) is essential, as the capillary tube would otherwise become clogged. Just before permanently inserting the capillary tube in its place, it is advisable to draw a strong current of air through the cotton filter with the suction pump, thus removing any fine particles that might be in the cotton. The stoppers are next securely fixed with the screw caps and the capillary regulator is complete. It is essential that these stoppers be absolutely air-tight.

In using the apparatus some precautions are necessary. In those cases complicated by a severe cystitis, the clogging of the catheter by mucus and pus may be prevented by daily irrigations of the bladder. The urine bottle must be emptied before it has become entirely filled, lest the urine be drawn over into the air tube and the capillary tube clogged and ruined. For the same reason it is necessary that, of the two tubes ending within the urine bottle, the one from which the urine drips be the longer. Rubber stoppers must be kept tightly in bottles. The capillary regulator must be handled with care, as the delicate tube is easily broken. Once it is suspended within the vacuum bottle it is in a safe place and may remain permanently undisturbed. A dressing upon the incision tends to become wet by capillary attraction, and for this reason it is better to paint the stitches with iodine and leave the incision entirely uncovered. The apparatus may be applied within the first twenty-four or forty-eight hours after operation; that is, as soon as there are no longer blood-clots in the bladder. After about two weeks the sinus has granulated tightly around the catheter, and when the latter is removed the sinus closes very rapidly.

The advantages of this drainage method, both to patient and to hospital, need not be enumerated. Those cases that develop ammoniacal urine derive special benefit because, by the constant suction, the bladder is kept empty and is thus saved from continued contact with ammoniacal urine. Furthermore, the short time that the urine is allowed to remain in the bladder is not sufficient for it to decompose and develop ammonia. The complete absence of uriniferous odor, even when the bed clothing is turned down and the incision examined, is worthy of mention. The apparatus may be applied to bedridden patients with biliary fistulæ, or fistulæ of the first portion of the small bowel, where there is a profuse fluid discharge, irritating to the skin. I have had no opportunity to try it on a pancreatic fistula.

I am indebted to Dr. George Walker for helpful suggestions and for his kindness in permitting the use of cases in making the necessary preliminary experiments.

DILATATION IN URETERAL FISTULÆ[1]

By WILLIAM WARREN TOWNSEND, M.D., F.A.C.S., Rutland, Vermont

THE causes of ureteral fistulæ are well known. They originate from internal and external sources; the former may be either tuberculous or malignant ulceration, which finally leads to perforation, or the pressure of an impacted stone which destroys the wall of the canal either by mechanical perforation or in a sloughing process resulting from the pressure. Of external causes one of the most familiar and longest known is pressure upon the ureter by the fœtal head during protracted or difficult labor. So-called traumatic fistulæ are due as a rule to accidental division of the canal in the course of operations involving the parametria. The urine escapes into the neighboring tissues and induces abscess formation which points either outwardly or discharges into one of the hollow viscera. The fistulous opening may be longitudinal or transverse. The longitudinal openings are associated with leakage from the side of the canal, and for a time, until partial repair or stricture occurs, some urine may be directed normally, as happened in the case of Jeanbrau to be reported later. After transverse division the upper segment shows a strong tendency to retract. Multiple fistulæ have resulted at times from the discharge of an abscess in different directions. For example, cutaneous, genital, and intestinal fistulæ occasionally coexist. When the ureter has been severed and the ends of the two segments lie in the abscess cavity, the inferior of the two gradually undergoes atrophy.

Basing our opinion on the three cases to be reported, we believe that a certain percentage of ureteral fistulæ may, if seen sufficiently early, have the "tide turned" so that extensive operative procedure may be eliminated. Case reports are exhausting, but in order to illustrate the position of dilatation in ureteral fistulæ we will ask you to pardon the abstracts taken from the hospital records of the following cases:

Case 1. Mrs. M., operated on at the Rutland City Hospital for a large uterine fibroid; a supravaginal hysterectomy was done. At the time of operation an annoying hæmorrhage occurred from an enlarged branch of the uterine artery and the surgeon clamped *en masse*, later separating and tying off the vessels individually. One week following, urine was found to be soaking the vaginal pads, and an examination showed it to be coming from the stump of the cervix. We were asked by her physicians, Drs. Crain and Gale, to cystoscope and catheterize the ureter in order to determine the function of the left kidney, as a repair to the ureter or a nephrectomy was being considered. We found that a No. 7 catheter passed readily to the kidney of the left side, and the same sized catheter passed 4 cm. into the right side before meeting obstruction. Within a few hours it was quite apparent that there was less drainage. This was estimated by comparing the number of soiled pads in a given time. At the end of the first week it was calculated to be less than half the quantity drained prior to catheterization. This result encouraged the patient and her physician to a further attempt at dilatation. At this time we used a No. 10 French catheter, and much to our surprise it passed over the obstruction and on into the kidney pelvis. The patient would not consent to our leaving it in, so it was reluctantly withdrawn. Following this dilatation the drainage by the vagina ceased entirely, and a subsequent cystoscopy and ureter catheterization showed an equal quantity of normal urine coming from both ureters. At the present writing the patient is enjoying perfect health.

Case 2. Mrs. B., operated on at the regular gynecological clinic of the medical college of the University of Vermont for a large ovarian cyst. During its removal the right ureter was torn and an end-to-end anastomosis was immediately done by the operating surgeon, Dr. P. M. McSweeney. Several days later, urine was noted on the abdominal dressings and it grew more profuse daily. We were asked to determine the condition of the kidney on the opposite side, and after estimating its output we passed a catheter into the right ureter; it passed 3 cm. and then met with obstruction. After making moderate pressure it "rode" the obstruction and passed to the kidney pelvis; through it a continuous flow of urine came which suggested a beginning hydronephrosis. We decided to leave the catheter in, and the drainage immediately ceased through the abdominal incision; 352 ccm. of urine drained through the catheter the first twenty-four hours. At the end of a week, as the patient was dry and comfortable, Dr. McSweeney, believing that it would be safe to remove the catheter, did so; within an hour urine appeared in the abdominal incision. The following week when we went to Burlington we tried to repeat our former performance of passing a catheter up the affected side, but were unable to do so, and catheterizing the stump failed to bring any urine through the catheter. A nephrectomy was finally done on the case after an unsuccessful attempt at repair of the ureter was made. At this time it was impossible, owing to extensive adhesions, to make out what the pathology might have been, as all surgical landmarks were lost.

I believe this case would have gone to a successful end had the catheter been left in the ureter until the abdominal wound had healed.

Case 3. H. N., referred by Dr. R. S. Macdonald of Plattsburg, New York, was operated for an appendiceal abscess in 1908. The appendix was not removed, the abscess was drained, and an uneventful recovery was made. In September, 1913, he developed symptoms of intestinal obstruction and a mass was discovered in the right iliac region. In October, 1913, Dr. Macdonald cut down on it; pus was found, and a vigorous hunt was made for the remnant of appendix. During the search the ureter was

[1] Read before the American Association of Genito-Urinary Surgeons, White Sulphur Springs, West Virginia, May 18–20, 1915.

exposed and must have been injured, but the injury was not recognized, for in five days urine came from the abdominal wound. At this time we were asked to see him for the same reason as in the previous cases; namely, to determine the function of the kidney of the opposite side. The catheter passed to the left kidney pelvis. The right catheter met with obstruction after passing 10 cm., and the urine came through the catheter. I was gratified to learn from the doctor that two days following this dilatation no urine came through the wound. The abdominal wound healed, and the young man is in perfect health and has perfectly normal urine coming from both ureters.

In a review of the literature we found but four cases that approximate the above experiences, namely, the cure of ureteral fistulæ by dilatation, and while in two the method of approach for dilating was different, the principle involved was the same.

A case reported by Jeanbrau (1) and believed at that time to be unique was that of a woman who soon after marriage showed evidence of marital infection. A posterior colpotomy was done to drain a pelvic abscess, following which a ureterovaginal fistula developed. Urinary segregation showed that the left ureter was the leaky one, as there was but a small quantity of urine coming from it as compared to the right one. Jeanbrau put a catheter in the ureter and left it for six days; no more urine drained from the vagina. He concludes his article, which is given in great detail, by stating that he later operated on the patient and removed the uterus and adnexa.

Seiffart (2), in reporting a case of uretro-abdominal fistula, stated that he cured his case by catheterizing toward the bladder through the abdominal wound, and was surprised to find that "he had restored the connection between the kidney and bladder." He accomplished this result by gradual dilatation of the inferior segment daily. After four months of such treatment the abdominal wound filled in, "the distance between the two ureteral ends became lessened, and finally the urine took a normal course."

Albarran (3) reported, at the surgical congress at Lyons, his results in the treatment of a ureteral fistula due to a calculus which had become impacted at the pelvic narrowing of the ureter. An abscess formed with a resulting abdomino-ureteral fistula. He cut down on the ureter, which, to quote his article, he found "so inflamed and embedded he could not think of suturing it." He removed the calculus and then went into the bladder suprapubically; he passed up ureteral dilators to the kidney pelvis and then put in a retention catheter through which "the kidney pelvis was washed out." His case made a good recovery. He concluded his remarks by stating that in a certain number of these ureteral fistulæ the kidneys could be saved by this process.

Boeckel (4) reported the case of a woman, age 45, who was operated on November 4, 1911, a Wertheim operation under spinal analgesia being done. The case went well for eighteen days; then urine began to escape by the vagina, and a diagnosis of uretrovaginal fistula was made. After a number of efforts a ureteral bougie was passed up to the kidney pelvis; the following day a larger one was passed, and lastly a catheter was introduced on December 24 and allowed to remain until January 2. When the case was last heard from, April 13, she was doing well, and no urine was coming by the vagina. The author stated that he knows of no similar case except that of Jeanbrau, which has been referred to by us.

As was stated in the abstracts of our cases, catheterization was carried out not for curative but for diagnostic purposes; i.e., to determine the functional capacity of the kidneys. The pathology was quite unknown, as in two cases no abdominal section was made, and in the case of Mrs. B., as stated, it was impossible to determine what the pathology was.

Undoubtedly, many of us have had similar experiences, but the reports of their cases have not found their way into the literature, and we tender the paucity of reports as an excuse for calling the attention of the members of this association to this simple procedure. As regards the possible danger of catheterizing the ureter in the class of cases reported, for fear of infection or untoward trauma, we believe it to be theoretical. There should be no danger of infection or trauma if precaution and care are exercised.

Some authorities write in a general way of spontaneous healing as a termination of ureteral fistula; others such as Guiteras emphasize the infrequency of this outcome. Personally, we believe that the spontaneous cure comes about as a result of hydronephrosis and atrophy of the kidney, thus shutting off the secretion. This could not have been the outcome in our cases, as cystoscopy has shown that urine comes from both ureters.

In conclusion, the fact that the distal segment of the ureter undergoes atrophic change within a relatively short period appears to indicate that the early trial of dilating the stump through the bladder in a rational attempt to preserve its

integrity may save the kidney or a ureteral anastomosis. In urethral fistula we know that any stenosis will cause perpetuation of the fistula. In such cases dilatation of the stenosis aids in closing the fistula; we believe it to be so in ureteral fistula, and we trust that in the report of these cases we may stimulate the members of this association to a trial of this method, and the subsequent publication of their results.

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ACUTE TORSION OF THE RIGHT INTERABDOMINAL SPERMATIC CORD, THE SYMPTOMS OF WHICH SIMULATE ACUTE APPENDICITIS

BY RALPH C. CUPLER, PH.G., M.D., CHICAGO
Surgeon, St. Anthony's Hospital

I HAVE recently had occasion to witness an interesting case which presented the symptoms of acute appendicitis or torsion of the right interabdominal cord.

The patient, a strong adult male, entered St. Anthony's Hospital at 8 a.m. November 1, 1913. He had had no previous abdominal symptoms. His present trouble began about 1 a.m. on November 1, 1913. He presented the classical syndrome of an acute abdominal crisis. Examination showed the absence of the right testicle. It had never appeared in the scrotum or inguinal canal. Pain came on suddenly, was severe, and was followed by vomiting, rapid pulse, tenderness and rigidity in lower right abdominal region, elevation of temperature, and a leucocyte count of 18,000. Differential white count was not recorded.

The diagnosis of acute appendicitis or torsion of the right interabdominal spermatic cord was made at 8 a.m. the following day. The abdominal cavity was opened by retracting the fibers of the rectus muscle inward. The testicle was located midway between the umbilicus and the anterior superior spine of the ilium. The testicle moved freely, being suspended by the spermatic cord. The cord contained two complete revolutions and by reason of this had occluded the blood supply to the testicle. The structure involved showed that the process was acute, and the testicle presented the appearance of gangrene. The cord and testicle were removed. The appendix was normal.

This condition should be considered in the diagnosis of acute appendicitis.

PROLAPSE OF THE UTERUS OF UNUSUAL ORIGIN

BY J. R. JUDD, M.D., F.A.C.S., HONOLULU, HAWAII

A PROLAPSE of the uterus to the third degree in a young nullipara caused by the presence of inflammatory tissue in the pelvis is sufficiently rare to be worth recording.

The patient was a Hawaiian girl, 21 years of age. Four years ago she had contracted gonorrhœa. Two years ago she first noticed a protrusion at the vulva which was especially prominent on exertion. During menstruation she claimed that the protrusion receded somewhat. For the past year she had suffered a good deal of pelvic pain. Examination showed a prolapse of the uterus of the third degree. The cervix was not ulcerated. The uterus was fixed and could not be replaced, and the pelvis was filled with a large, tender mass.

At operation the pelvis was found to contain an inflammatory mass involving the uterus, adnexæ, bladder, and rectum. With considerable difficulty the bladder was separated from the anterior wall of the uterus, a sound in the bladder acting as a guide. A small piece of ovarian tissue was identified and allowed to remain. The improbability of being able to separate the structures successfully was recognized, so the mass was removed in one piece. It was then discovered that several inches of rectum, incorporated in the mass, had been removed with it. The continuity of the bowel was established by Gibson's tube method, which was easy of execution. It was noted that the cervix receded at once as soon as the inflammatory tumor was removed. The patient made a satisfactory recovery with drainage at the lower end of the wound.

Examination of the specimen showed the body of the uterus, tubes, ovarian tissue, and piece of rectum hopelessly involved in dense, firm, inflammatory tissue, the whole constituting a tumor the size of an adult head. There were several abscess cavities containing sterile pus.

A NEW OPERATION FOR COLON EXCLUSION

By A. B. SMALL, M.D., Dallas Texas

SINCE Lane first enunciated his drainage scheme by means of colectomy, many modifications of his device have appeared in the literature. Objections have been registered against all the modifications as well as the original operation.

In a study of the subject while observing twenty-five cases operated, the first dating from January 3, 1912, for many reasons to be detailed in a later paper, the following operation seems most advantageous; namely, the resection of the terminal end of the ileum, the cæcum and ascending colon to be circumvented by anastomosing the ileum with the lower segment of the sigmoid.

The technique of the operation is briefly as follows:

Step 1. The ileocolic, the right colic, and a slender branch from the superior mesenteric anastomosing in the terminal six inches of the ileum with the ileocolic, are ligated. The structures which receive their supply from these blood-vessels are then separated from their attachments, "mobilized" and lifted out of the abdominal incision where the gut is clamped, and the resection completed with a negligible loss of blood.

Step 2. The raw base from which the structures have been removed is now covered by the parietomural flap, made fast by interrupted catgut sutures to the opposing mesoperitoneal margin.

Step 3. The operation is completed by doing an ileosigmoidostomy.

Advantages as seen in this technique are as follows:

1. In it the least amount of manipulation of the intestines is made, hence the least degree of shock to the patient.

2. It eradicates the fountain head of infection in 90 per cent of the extreme cases of intestinal stasis.

3. It displaces the ileum in the least degree from its normal position and downward so that gravity aids rather than retards its action.

4. The omentum is left undisturbed.

TRANSACTIONS OF SOCIETIES

CLINICAL CONFERENCE OF THE NEW YORK NEUROLOGICAL INSTITUTE

REGULAR MEETING, MARCH 18, 1915, DR. J. RAMSAY HUNT IN THE CHAIR

CRANIOTOMY AND REMOVAL OF MULTIPLE BRAIN TUMORS

DR. CHARLES A. ELSBERG presented a patient who was admitted to the Third Division and operated upon in February, March, and April 1913. Twelve years before, the man was struck on the head by a falling timber, sustaining a scalp wound. In October, 1912, he began to complain of severe pain in the back of the head, which gradually became worse and was most severe at night. Two weeks before admission the pain became so severe that the patient threatened to commit suicide. One year before he noticed a lump on his head at the site of the old injury. The examination showed on the posterior part of the right parietal horn near the median line a swelling about two inches in diameter, slightly tender on pressure. Over the greatest prominence of the swelling was a small scar one inch long. The cranial nerves were normal except the second. Dr. Holden reported that the margins of the discs were blurred, and there was swelling of one diopter in each eye. Vision 20/30. The right wrist-jerk was slightly stronger than the left, and the grip of the right hand slightly weaker than the left. The knee-jerks and ankle-jerks were exaggerated on the left side. There was a marked disorientation; when the patient walked outside of his room he was unable to find his way back to his room. This was not due to defective vision but to the fact, as the patient expressed it, that he had lost his way, and didn't know his way back to his room.

On February 25, 1913, Dr. Elsberg operated. A large flap of scalp was turned down over the region of the swelling which consisted of soft vascular bone; a large amount of it, measuring 4 x 6 cm., was removed and the dura exposed. The dura was much thickened and bled as soon as it was touched. The scalp flap was returned to its place. Further manipulations were deferred because the patient had lost much blood from the vascular bone.

Ten days later the wound was reopened and the dura incised. The dura was in parts at least 2 cm. thick and the bleeding from it very free. When the dural edges were retracted, the cortex appeared normal. Palpation at once revealed two large hard masses underneath the cortex: one near the median line, the other low down in the parietal region. The cortex was incised over each mass, and two tumors, each measuring 4 x 5 cm. in diameter, easily shelled out of the brain-tissue. When the dura was examined it was found that it was much thickened in all directions. The examining finger could feel the falx cerebri at least one inch thick and very irregular. The thickening of the dura extended backward to the tentorium and downward to the temporal lobe. As the patient's condition was poor, nothing further was done; the dura was left wide open, and the skin wound closed in the usual manner. Convalescence from the operation was uneventful. Within one week the eye grounds were normal, the patient had lost his headache completely, and the disorientation was gone. He was out of bed within ten days—apparently well. Three weeks later the wound was again opened and an attempt was made to remove the diseased dura. This could only be partially done, as the falx cerebri could not be removed in spite of ligation of the longitudinal sinus. The patient recovered from the operation and remained well for two years.

The pathologist reported the tumors and the dura to be endothelioma; the affected bone was a rarifying osteitis.

The interesting features about this case were the presence of two large tumors without localizing signs, the remarkable disorientation, the fact that the patient remained well in spite of the fact that the disease still remained, and finally the appearance of disease of the bone, dura, and brain at the exact location of the former injury.

The patient had been presented before the New York Surgical Society six months before. During the past four months his symptoms have begun to return. There is now considerable bulging at the site of the operation, and the patient is very unsteady on his feet. He now has considerable headache every day. It is evident that the disease, after a period of quiescence, has again advanced. At the present time, the condition is a hopeless one.

EXTRAMEDULLARY SPINAL TUMOR WITH FALSE LOCALIZING SIGNS; COMPLETE RELIEF AFTER REMOVAL OF TUMOR.

DR. ELSBERG presented Harry R., age 24, who was admitted to the Neurological Institute in

January, 1912, with a history of one year's standing. He first noticed a tickling sensation in the calf of the right leg, gradually extending upward. This persisted for ten months when he noticed while taking a bath that the upper part of his body was more sensitive than the lower. Nine months before, the right knee became stiff and he had difficulty in walking. Four months ago the left leg became similarly affected. Since that time he has grown gradually worse up to the time of admission. At this time there was a marked spastic paraplegia of the lower extremities with sensory symptoms of all three sensations to the level of the tenth dorsal segment. Wassermann and X-ray were negative. The patient refused operation and left the hospital.

He returned on the first of July in a much worse condition. He was bedridden. There was complete paralysis of the lower extremities with marked bladder and rectal disturbances. The physical examination showed spastic paraplegia of both lower extremities with exaggerated reflexes, ankle clonus, Babinski and Oppenheim. Sensory symptoms consisted of a diminution of all three sensations up to the tenth dorsal level on the right side and a total loss of feeling to same level on the left.

Laminectomy was performed on July 5, 1912, the spines and laminæ of the five lower dorsal vertebræ being removed. Nothing was found to explain the symptoms. The patient went home after two weeks, unrelieved.

He was next seen at Montefiore Home in January, 1914. At this time there were symptoms, both sensory and motor, up to the level of the second dorsal segment with no sensory disturbance in the upper extremities; therefore this part of the cord was exposed by laminectomy on January 6, the seventh and eighth cervical and first and second dorsal spines being removed. Nothing was found over the region of the spinal cord exposed. A probe passed upward, however, met with a resistance at the level of the sixth cervical; therefore three more spines and laminæ were removed in an upward direction and at the upper area of the cord exposed far above where the symptoms had indicated, a small extramedullary tumor was found and easily removed. Convalescence and operation were uncomplicated. Improvement started at once, and at the present time the patient is practically well, able to walk long distances without trouble, and all of the motor and sensory symptoms have disappeared.

The interest in this case lay in the shifting of the level symptoms. In July, 1912, the symptoms pointed clearly to the tenth dorsal segment; in January, 1914, the symptoms pointed to the second dorsal segment, but the tumor was found at the sixth cervical segment.

PUNCTURE OF CORPUS CALLOSUM FOR HYDROCEPHALUS

Dr. Elsberg presented a child of three years who had had a four-months' history of rapidly advancing hydrocephalus. During two weeks preceding the operation the child had become drowsy; an optic neuritis which had existed for three months became much aggravated so that sight was almost lost and the pupils no longer reacted to light. At the same time a spasticity of the lower extremities became so extreme that the limbs were stiff and could not be moved or bent at the joints. There was marked nystagmus and extreme enlargement of the head. The patient was seen by a number of neurologists and the diagnosis made was either idiopathic hydrocephalus or cerebellar tumor.

On February 16, 1915, Dr. Elsberg performed puncture of the corpus callosum—a large amount of fluid being evacuated from the ventricle. Improvement was immediate after the operation. Within twenty-four hours the pupils again responded to light, the spasticity in the lower extremities was much decreased, and the child was much brighter. From that time up to the present the improvement has steadily continued. At present, the mental condition is normal, the size of the head is greatly less, almost all the spasticity in the lower extremities has disappeared, and sight is practically normal. Before the operation, the swelling of the discs measured 6 diopter; at the last examination two days ago all swelling had disappeared and the eye grounds were practically normal.

The case demonstrates the great benefit that will follow puncture of the corpus callosum in some cases of hydrocephalus.

INTRAMEDULLARY SARCOMA OF THE CERVICAL CORD; EXPLORATORY OPERATION

Dr. Foster Kennedy presented from the Second Division the case of H. G., age 21, admitted to the hospital complaining of pain in the back of the neck and disability in the left upper extremity. At the onset in November, 1914, there was slight indefinitely located pain in the left shoulder which had been present for one week; then sudden loss of power in the left shoulder girdle muscles when in the act of hanging up his coat on a hook. He was seen two weeks later at the Cornell Neurological Clinic, where he was found to have profound weakness and atrophy in the left deltoid, biceps, and triceps, with less marked weakness in all the forearm and intrinsic hand-muscles of the left side. The triceps jerk was absent on the left side; the left supinator jerk was weak. The abdominal reflexes were absent; the plantar reflexes, left flexor, right doubtful. Knee-jerks, left greater than right. Sensory examination then showed a marked loss of appreciation of superficial pain over the right side of the trunk below the level of the fifth cervical segment. This obtained also in the right lower extremity. Superficial pain as has been said was felt less well in affected areas, but at the same time there was produced by each stimulus a fairly widely diffused tingling sensation not experienced on the left side of the body. Similar loss to pain was found

on the inner side of both upper extremities, but pain stimuli on the left arm did not produce tingling as they did on the right arm. Loss of power to discriminate between temperatures was found in the areas affected by changes in pain sensibility. Occasional mistakes in position sense were made in the left toes; none in the right side. Touch sensation was everywhere sharply appreciated.

These findings led to the initial diagnosis of a hæmorrhage into a syringal cavity. The extraordinary acuteness of the onset, together with the dissociation in sensibility, seemed to leave no room for doubt in the matter. The Wassermann test in the blood and cerebrospinal fluid was negative, but the latter showed a definite increase in globulin content. However, in the course of the next six weeks there occurred definitely progressive weakness in the forearm and intrinsic hand-muscles of the left side. Pain in the neck became very severe and radiated into the left arm and occasionally into the right. X-ray examination was negative. This steady progression in symptoms caused a change to be made in the diagnosis, it becoming apparent that the fourth and fifth cervical segments were the seat of an expanding lesion, most probably neoplasm. The development of slight urinary incontinence strengthened this belief.

Exploratory laminectomy was performed by Dr. Elsberg in the beginning of February. The last three cervical segments of the cord were seen to be swollen and a small incision in the posterior columns revealed the presence of a dark-red mass occupying the center of the core. Superiorly the mass was homogeneous and resembled blood-clot; inferiorly it looked like formed tissue and a portion was removed with difficulty for microscopic examination. The results of the operation were an increase in the left upper extremity palsy and some spasticity in the left leg with, however, an almost complete cessation of pain in the neck. Catheterization was required for ten days after which the bladder function became normal. The growth was found to be a round-celled sarcoma. In the past week there has developed a progressive weakness in the right hand muscles and pain in the neck, shooting down the right arm similar to that which was formerly present on the left side.

Dr. Abbe has kindly consented to treat the case by the application of radium, no improvement being hoped for by further operative procedures.

AVULSION OF THE LOWER ROOTS OF THE LEFT BRACHIAL PLEXUS; EIGHTH CERVICAL AND FIRST DORSAL TRANSFERRED BY LATERAL ANASTOMOSIS INTO THE JUNCTION OF FIFTH AND SIXTH CERVICALS

Dr. Alfred S. Taylor presented Eleanor L., age 8, from the First Division of the Neurological Institute. When she was two years old an impatient nurse had jerked her upward suddenly by means of the left arm. She complained of pain in the left shoulder and the family doctor put on an adhesive plaster dressing. After the adhesive dressing had been on for two weeks she was taken to another physician who found a subglenoid dislocation of the shoulder which he reduced. From the time of the injury there was marked loss of power in the extremity, which also failed to grow as it should.

Physical examination. The patient is a well-developed, well-nourished child, sound everywhere except in the left upper extremity, which is considerably under-developed and shows the typical deformity of ulnar paralysis. There is paralysis and atrophy of the intrinsic muscles of the hand which derive their innervation from the ulnar nerve, as well as of the flexor and extensor carpi ulnaris. There is practically no power to flex the ring and little fingers, nor to adduct the hand. The intrinsic muscles of the hand supplied by the ulnar nerve show no response to either galvanic or faradic current. There was some difference of opinion as to the response of the flexor and extensor carpi ulnares, but they were obviously atrophied. Outside of the ulnar distribution the muscles showed normal reactions, although the whole extremity was smaller and less well-developed than that on the right side.

The left eyeball and the left palpebral fissure are very slightly smaller on the left than on the right side. The reflexes in the lower extremities are normal and equal on the two sides. The case is obviously one of traumatic ulnar paralysis and the question is whether the trauma occurred in the axilla opposite the head of the humerus which is said to have been dislocated, or whether the lower two roots of the brachial plexus were damaged near the spinal cord. The conditions noted in the left eyeball and palpebral fissure would lead one to feel that the damage was close to or within the spinal canal.

Operation January 30, 1915, by Dr. A. S. Taylor, under ether anæsthesia. The incision started near the clavicular insertion of the sternomastoid muscle and passed outward and slightly upward across the base of the neck. This incision was carried directly down to the plexus. All the roots and cords of the plexus appeared normal to sight and touch, there being no deformity and no adhesions about the nerves. The finger was passed beneath the clavicle and down into the axilla. There were no adhesions or other signs of traumatism in the axilla such as would have existed opposite the shoulder joint had its dislocation been the cause of the ulnar injury. There was left then only the alternative that the two lowest roots of the plexus had been torn within the spinal canal. These roots, eighth cervical and first dorsal, were divided and inserted into a longitudinal slit in the junction of the fifth and sixth cervical roots, where they were fastened by fine catgut sutures. The wound was closed without drainage. Healing was by primary union.

The fixation dressings were removed after five

weeks and massage and passive motion started. There was prompt improvement in the nutrition of the extremity, but of course insufficient time has elapsed for any regeneration to have occurred in the ulnar nerve.

April 9, 1915. A note from the father states that there has been remarkable improvement in the whole extremity, so that the prognosis seems to be favorable.

TRAUMATIC INTERSTITIAL NEURITIS OF THE RIGHT ULNAR NERVE; NEUROLYSIS FOLLOWED BY PROMPT AND CONTINUING IMPROVEMENT

DR. ALFRED S. TAYLOR presented from the First Division a man 32 years old. In July 1914 the patient swooned from exhaustion just after contesting a competitive field athletic event. During the period of unconsciousness some unknown physician gave him an injection of strychnine (reported by friends), thrusting the needle into the inner aspect of the right upper arm at about its middle. After the return of consciousness the inner side of the right hand and forearm felt numbed, and he found that the fine coördinated movements of the hand and fingers were lost to his control so that he could not write although he had previously been an expert penman. In addition to the loss of sensation and motion there soon developed an atrophy of the muscles of the ulnar side of the forearm and the muscles of the hand supplied by the ulnar nerve.

These symptoms steadily increased in severity up to the time he entered the Neurological Institute on March 8, 1915, some eight months after the traumatism. The ring and little fingers are the site of constant severe pain, which gets worse rather than better as time goes on.

Physical examination. General condition fair. The right forearm and hand show the typical deformity of ulnar paralysis. There is atrophy of the interossei, and some atrophy of the hypothenar eminence. The thenar seems normal. There is atrophy of the muscles of the ulnar side of the forearm. The power of flexion is practically absent in the little finger, and very slightly present in the terminal phalanx of the ring finger. He cannot adduct the little finger but can very slightly abduct both it and the ring finger. The ulnar nerve does not respond to either electric current. The median and radial respond normally. All the muscles supplied by the ulnar nerve show no response to either current. All the other muscles respond normally.

Operation March 8, 1915, under ether anæsthesia. Incision was made over the course of the ulnar nerve in the middle third of the right upper arm, and the nerve was exposed for a length of 12 cm. The middle 4 cm. of this exposed nerve was nearly twice as thick as the nerve above and below, was somewhat fusiform in shape, and was of a dull reddish color. The outer sheath was much denser than normal and was distinctly adherent to all the surrounding structures. It was entirely removed by careful dissection. By similar dissection the thickened sheaths of the bundles which go to make up the whole trunk of the ulnar nerve were removed, until the fibers were obviously no longer compressed by cicatricial tissue. The bundles were all placed together and then wrapped in Cargile membrane. The wound was closed by silk sutures. Healing was by primary union. Improvement in ulnar function began promptly after the operation and has continued rapidly up to this time, which is 10 days after operation. Sensation to pin-prick has returned in the two fingers previously anæsthetic, and motion is returning in the flexor muscles.

LAMINECTOMY FOR DORSAL PACHYMENINGITIS

DR. R. G. CANNADAY presented a patient from the service of Dr. Peterson who was operated on November 20, 1913. She was a young woman who at ten years of age had some spinal trouble, for which she was in bed for a number of weeks. She was well until three years before, when she began to have pain in the upper part of the chest extending to the left shoulder. The pain persisted off and on until five weeks before operation, when it disappeared. Two months before, she began to stagger when walking and had a girdle sensation around the upper part of her body. Physical examination showed a marked spasticity of the lower extremities. Abdominal reflexes were absent. The right lower limb was weaker than the left, the right knee-jerk and ankle-jerk were much exaggerated, there was right patellar and double ankle colonus, double Babinski and marked diminution in deep muscle sense in both lower limbs. Tactile and pain sensation were slightly diminished below the fifth dorsal level. Thermal sensation was diminished to the knees, absent below this. By laminectomy Dr. Elsberg removed the arches of the fourth to seventh dorsal vertebræ. The dura was found much changed; at the fifth and sixth dorsal level it was swollen as if there was a tumor underneath, but examination showed that the swelling was in the dura itself. When the dura was incised it was found almost 1 cm. thick over an area of 4 cm., very hard and firm and compressing the cord underneath. The thickened portion of the dura was excised and the wound closed in the usual manner. For some weeks after the operation the patient complained of marked root pains over the fifth and sixth dorsal. These soon disappeared. The spasticity gradually decreased. Within three months she was relieved of almost all of her symptoms and has remained well.

Pathological report was chronic inflammation.

EXTRADURAL SPINAL TUMOR PRESENTING UNUSUAL SYMPTOMS

DR. ELSBERG presented a patient admitted to the service of Dr. Collins in October, 1913. His first symptoms were staggering and weakness of the lower limbs three months before. The weakness

soon became so marked that he often fell to the ground. He was examined in the out-patient department a number of times and the only signs that could be discovered were lively knee-jerks and ankle-jerks and irregular areas of tactile anæsthesia on the anterior surfaces of both thighs. Wassermann and X-ray were negative, and spinal fluid showed no increase of globulin. He was able to walk with difficulty until February, 1913. Then he became much worse, took to bed, and began to complain for the first time of a pain in the right side of the abdomen and pain in the back around the waistline when he tried to sit down. Physical examination showed that the left knee-jerk and ankle-jerk were exaggerated, the abdominal reflexes normal, exhaustible ankle clonus on the left side with Babinski and loss of deep muscle sense. He could not move the legs at all. Sensory examination showed a diminution of all three sensations up to the level of the twelfth dorsal segment.

Laminectomy was performed by Dr. Elsberg on February 14, the spines and laminæ of the ninth, tenth, and eleventh dorsal vertebræ being removed. On the right side of the dura was found a soft bluish tumor about 3 cm. long and 1 cm. wide adherent to the outer surface of the dura. The tumor was removed without difficulty; one nerve root ran over it having to be divided. The wound was then closed in the usual manner. Within three weeks the patient had regained complete control of the lower extremities with return of normal sensation. The tumor was a fibroma with calcareous degeneration.

The interesting features of this case were the late appearance of the nerve-root symptoms referable to the eleventh dorsal root and the very irregular sensory symptoms from the beginning.

LAMINECTOMY FOR REMOVAL OF SPINAL CORD TUMOR, AND SUBSEQUENT POSTERIOR ROOT SECTION FOR RELIEF OF SPASTICITY

Dr. R. G. Cannaday presented Mrs. S., age 50, who was admitted to the Third Division of the hospital on May 30, 1914, with the following complaints: Pains in the back and lower extremities and inability to walk or stand; incontinence of urine; contracture of the hamstring muscles of both legs. The history was as follows: Nine months ago she had an attack of grippe, and complained of pain and cold sensations all over her body. She got better of the grippe and about two weeks later she began to complain of a stiffness in the muscles of her thighs, with pain in her feet, ankles, knees, hips, and back. The pain in her back was located in the lower lumbar and upper dorsal regions. These symptoms progressed slowly, until about twelve weeks ago when she began to get rapidly worse. At this time she became very weak in the legs and found that she was unable either to walk or stand. Very soon afterward her hamstring muscles began to contract and flex her legs upon her thighs. Her ankles at this time began to swell. She was unable to extend her legs voluntarily, and when they were forcibly extended she would cry out in pain. Her incontinence began about three months before her admission to this Hospital.

Physical examination. Cranial nerves normal; pupils round, and react normally to light and on accommodation; biceps jerks active and equal; triceps jerks active and equal; wrist-jerks active and equal; abdominal and epigastric reflexes absent; knee-jerks present and equal; ankle-jerks present and equal; ankle clonus on both sides; plantar response was of the extensor type. Double Babinski. Special senses and viscera negative. Sensory examination showed a complete loss of pain, temperature and tactile sensation from the third dorsal segment downward. Analysis of the spinal fluid was negative, except for an increase of globulin; examinations of urine and blood, negative; Wasserman reaction of blood and spinal fluid, negative.

Operation on June 10, 1914; a *laminectomy* was performed by Dr. A. S. Taylor. The spines and laminæ of the second, third, fourth, and fifth dorsal vertebræ were removed, as well as a tumor about one inch in length and three-quarters of an inch in thickness lying opposite the third and fourth dorsal, outside of and adherent to the dura.

Examination on July 6, 1914. Abdominal and epigastric reflexes still absent. Knee-jerks not obtained. Ankle-jerks present and equal. Right ankle clonus. Double Babinski reflex.

Pain sense gradually dulls going downward beginning about the level of the seventh dorsal segment and is not as acute on the right as on the left. There is no place in which the perception of pain is lost, but seems to be delayed. Perception to cold had returned and was well defined. The patient readily responded to the stimulus in the part of body where the sensation to cold was at one time wholly lost. Response to stimulation with heat had returned, but was not as acute as the response to stimulation by cold. Tactile sensation is well appreciated all over body. There is a dulling on the legs but can feel when touched. The spastic condition still persists and patient's legs are flexed tightly on her thighs. Cannot extend her legs voluntarily and cries out in great pain when force is applied.

Examinations on August 18, September 7, and October 5 did not show any especial changes.

On December 2, 1914, another operation was done by Dr. Taylor. The left laminæ of the third, fourth, and fifth lumbar and the first sacral were removed, and a posterior root section of the third and fifth lumbar and the first sacral was done on both sides. Before the operation an effort to straighten the patient's legs under ether was made. This, however, was impossible. She made an uneventful recovery from the operation and the spasticity began to improve almost immediately.

At present she can extend her legs and is able to walk with crutches. She has good control of sphincters of the bladder and bowel, but still complains of some pain in the knees.

CHICAGO SURGICAL SOCIETY

REGULAR MEETING HELD MARCH 5, 1915, WITH THE PRESIDENT, DR. DANIEL N. EISENDRATH, IN THE CHAIR

DR. JACOB FRANK presented three cases, as follows:

PETIT-MAL DUE TO ADHESIONS BETWEEN DURA AND BRAIN

CASE 1. Mr. R. H., aged 22, in September, 1912, while engaged in an argument, was struck on the head with a clock. This occurred on Friday. The following Sunday he became unconscious, and remained at home in this condition three days. He was then transferred to the University Hospital, where he remained nine or ten days without improvement. His people were then told that immediate operation was necessary to save his life, whereupon he was brought to the Columbus Hospital. When I saw him he was unconscious and could be aroused only by deep pressure over the superior orbital nerves. An X-ray was taken, revealing a depression on the left side of the head.

The operation was done in the usual manner: The skull was raised, the dura opened, and clots and bloody fluid which had invaded the subdural space were removed. There was immediate improvement. His pulse became better and consciousness gradually returned. Unfortunately infection of a saprophytic nature took place. The dura was sewed with catgut, and during this infection some brain tissue was lost. A few spicula of bone were removed some six or eight weeks thereafter, but he left for home apparently in good condition about three months after the operation.

Four months later he had slight attacks of Jacksonian epilepsy or petit-mal. He would have two or three attacks a week, the attacks gradually becoming worse. An X-ray of the head was taken, which unfortunately was lost, but the skiagram did not show any spicula of bone. I made up my mind that there must be some adhesion between the inner table of the cranial vault and the dura, or between the dura and brain, which was causing his attacks. He returned to the hospital and the site of the previous operation was explored. Where the dura had been incised there was a strong adhesion. All cicatricial tissue was carefully removed and the wound was closed in a different manner. The first time no drainage was used, and I think this was the cause of the suppuration. The tissues could not take care of the blood which poured out between the scalp and the bone. At the operation for removal of this cicatricial tissue there was a great deal of bleeding. Instead of sewing up primarily, I packed the wound with gauze and placed sutures temporarily. The next day I removed the gauze and brought the sutures taut, using a small piece of gutta-percha as a drain. This was on July 4, 1913, just nine months after the injury occurred. He remained in the hospital a short time, made a complete recovery, and has not had any attacks since. He has married, has a child, and conducts a small business for himself.

In these cases where I leave out the bone, the dressings are held in place with Russian felt, which conforms to the contour of the skull and counteracts intracranial pressure.

CEREBELLAR ABSCESS; SUBDURAL HÆMORRHAGE

CASE 2. Miss R. K., aged 27. Twelve years ago while crossing the ocean she experienced a sudden pain in the right ear which lasted two days. There was no discharge from the ear at the time. Five years later she had an earache, which was slightly relieved by paracentesis. She does not remember whether any pus discharged, but there was some bloody discharge. Six weeks later another puncture was made without relief. When I first saw her, she apparently was suffering tortures, complaining of dizziness, tinnitus aurium, and excruciating pain. I advised immediate operation. She was taken to the hospital, and soon after arriving lapsed into unconsciousness, this state being associated with right-sided hemiplegia.

Thinking it was an ear case, her family wished to call in consultation Dr. Pierce. To this I readily consented.

The operation was performed the next day. Dr. Pierce searched carefully for pus in the mastoid region without success. It was then decided to attack the cerebellum. Dr. Pierce asked me to finish the procedure by opening the cerebellar fossa. A flap was turned down, and through a nick in the dura a blunt grooved director was introduced, whereupon foul-smelling pus began to flow. The opening was made larger, the dura was incised, and a forceps was pushed into the cavity, releasing a small cupful of pus. The cavity was explored digitally in every direction and through a counterpuncture in the scalp a large drainage tube was put in place. She remained unconscious two weeks, and then gradually began to improve. She had word-blindness at first, but in five weeks she recovered completely.

SECONDARY OPERATION FOR REMOVAL OF GASSERIAN GANGLION

CASE 3. Mrs. G., aged 30. Twelve years ago she was treated medically for four years for facial

neuralgia, without relief. Eight years ago an operation, the nature of which she does not know, was performed on her gums, affording her relief for three months. This operation was then repeated and in addition something was done to the inferior orbital nerve which relieved the pain again for two months, after which it returned and was severer than ever. Seven and one-half years ago she was operated on by a Chicago surgeon, and on recovering from the anæsthetic she could not open her eyelids. The eye itself was motionless, although the eyesight remained good. Ptosis remained two months. Partial control of the eye returned, but she could not close the lids entirely. After that the eye became red and painful and began to shrink. She was treated by this surgeon for five months, without relief, and was then transferred to an eye specialist, who continued treatment for one month; then the eye was enucleated. Following this she was well and without pain for two years. Again the pain returned, severer than ever. Another surgeon operated through the orbit, but the nature of the operation I do not know. This afforded relief for eight months, at the end of which time the pain returned as usual.

She came under my care in 1913. She was the most dilapidated individual I have ever seen. She could not open her mouth to talk or eat. A satisfactory history was not obtainable, but I made up my mind to go in at the location of the old scar. A large opening was made beyond this, the bone turned down, and all the zygoma removed to give plenty of space. The dissection was difficult on account of adhesions from the former operation. After the skull was opened I found that the surgeon who had previously operated on her had put in gutta-percha tissue to prevent the reunion of the nerves. Everything was clearly in view. The brain and the dura were raised with the handle of a soup spoon, and in dissecting off the cicatrix the dura was incised so that one could see the brain in some places. With a hook I could lift up a few fibers of the ophthalmic nerve that had not been separated. The second and third divisions of the fifth nerve looked as though they were intact. If these were divided previously the gutta-percha tissue did not keep the ends separated, but they had reunited. Thinking that the same thing might happen if the gasserian ganglion merely were divided, I pulled on the different divisions until they were loosened thoroughly, and cut them close to their attachments to the dura. In addition, all filaments of these branches going to the dura were dissected with scalpel and tissue forceps and cut away. The bone was not replaced. She began to improve and has continued well.

DISCUSSION

Dr. Norval H. Pierce: When I saw this patient she was suffering intense pain in the head. She had right facial paralysis, nausea, vomiting, and dizziness. A diagnosis of cerebellar abscess was made by the symptoms of intracranial pressure and by the presence of incoördination and attacks of vertigo in connection with a suppurating ear. She had spontaneous labyrinthine nystagmus; that is, nystagmus in which the movements could be well defined as of two components, quick and slow. The quick component was toward the diseased ear, and the slow component was toward the opposite side. Such nystagmus can originate only in the labyrinth or in the nervous mechanism back of the labyrinth. That it did not originate in the labyrinth was proved by the fact that the labyrinth was dead: it did not react either to sound or caloric influences. If we irrigate cold water into the external auditory canal we produce a nystagmus toward the opposite ear; that is to say, cold depresses the action of one labyrinth, so that normal action of the opposite labyrinth overweighs the depressed labyrinth. For example, if we irrigate a normal right ear with cold water, we produce a nystagmus with a slow component toward the right and a quick component toward the left. If we irrigate with hot water, we have the opposite effect. We stimulate the ear that is being irrigated. We proved in this case that the labyrinth was dead and yet the nystagmus to the right continued. A curious thing was that in turning experiments she apparently gave a reaction to the right ear. She had had a suppuration in that ear for some time. The history of these cases shows that they may have a slight discharge from the ear which is not sufficient to attract attention, and this discharge may go on for years, as it probably had in this case. The reaction we got in turning from right to left, was not due to stimulation of the right labyrinth in fact, but was a so-called compensation reaction, or a reaction that takes place from the opposite side after a labyrinth has been destroyed for a long time; that is to say, in case the right labyrinth has been destroyed and the left labyrinth is active, if we turn the patient from right to left (contraclockwise), we get a reaction normally; if we turn the patient rapidly ten times we get an after-nystagmus lasting for thirty seconds. In case a labyrinth is destroyed, we get nystagmus that will last for only ten seconds or less. This is due to compensation or overaction of the opposite or normal labyrinth.

This young woman still has a spontaneous nystagmus which comes out more obviously when we cause her eyes to turn in the direction of the quick component. It is very beautifully brought out in this case, the quick component being toward the right side. This nystagmus cannot come from the labyrinth because it is destroyed. It must come from irritation of the scar in the cerebellum or from some inflammatory action. It has been quite a number of years since she was operated on — I think six years — so that probably it is not due to inflammation.

Abscess of the cerebellum comes on most frequently from labyrinthine suppuration, as does meningitis in the posterior fossa.

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD MARCH 19, 1915, WITH DR. N. SPROAT HEANEY IN THE CHAIR

HÆMOLYSIS IN OBSTETRICAL CASES

DR. RUDOLPH W. HOLMES reported the following cases:

The blood dyscrasias have received not an inconsiderable amount of study at the hands of hæmologists — but this has largely been restricted to medical, and to an extent, to surgical diseases. The paucity of contributions on hæmolysis in obstetrics warrants, I believe, a brief report of the cases here presented, even though two of them were seen full ten years ago and one over a year ago.

Mrs. P., age 32; married; two living children, and one abortion three years before the onset of the disease to be narrated. Some three months previous to my seeing her, she was curetted for a profuse hæmorrhage — the fact of an early abortion not being determined. Her menstruations always have been regular from their onset at 14 years, painless, and of the three-day type. On August 12, 1904, the woman, feeling indisposed, took a dose of magnesium sulphate, or at least she presumed this was the cathartic. Shortly thereafter she was seized with dizziness, had an attack of emesis, and a pain in her back. Shortly after the development of the above symptoms she had an intense action of the bowels. In the early morning of the 13th she had an alarming uterine hæmorrhage at the time her normal period was due. On account of the actual hæmorrhage, Dr. J. V. Fowler was called; he tamponed the vagina, believing there was an early abortion. As there was severe prostration he called me to see the patient. He had to go to a neighboring telephone to call me, and was away hardly a half hour, if that; much to his surprise, on his return, he found the skin of the patient deeply discolored. The color was of a bronzing rather than the icteroid bluing of a biliary disease. On my arrival, probably within the hour after his return, the skin was most intensely discolored, the conjunctival, sclera participating in the change; this coloration resembled more nearly that of Addison's disease. I removed the tampon, and examined: the uterus was small, retroverted, perhaps somewhat softened. The liver was distinctly enlarged. The right kidney was easily palpable, enlarged, and freely movable. At no time was there any itching which so frequently accompanies a jaundice. By the second or third day the pigment had entirely disappeared, leaving the skin an alabaster whiteness. In the early morning Dr. Fowler found the temperature 104°, and pulse 120. A catheterized specimen of urine was obtained which was the color of the fluid extract of ergot; no blood-cells were found in the specimen — a true hæmaglobinuria.

She was admitted to the St. Mary's Hospital with a temperature of 102.8°, and a pulse of 140. On the 14th she passed a couple of stools which were clay colored. Her blood count showed, whites 58,000, reds 3,200,000; on the 15th the whites were 36,800. Her stomach contents contained free hydrochloric acid, blood, fat-cells, and much mucus. In the next days the vomitus was frequently admixtured with blood. The stools, which at first were clay colored, became dark brown, and at times green, with much mucoid fluid; at times the clay color recurred. After the 15th the temperature dropped to normal, or 99°, and so continued to the end; with the return of normal temperature her pulse fell to 80 or thereabouts, rising on the 27th to 140 or more. During these days her history was that of repeated small hæmorrhages from the stomach. There was a more or less constant bloody discharge from the vagina. Pneumococci were found in such profusion in the blood that it was needless to make cultures: a smear was sufficient. The cause of death from clinical findings was acute pneumococcic infection, a true bacteræmia, hepatitis, nephritis, colitis. A post-mortem was refused.

The second case was seen in the Cook County Hospital in the service of Dr. R. B. Preble, who was good enough to ask me to see the patient, as he had seen the first patient with Dr. Fowler and me. Unfortunately, the definite history of this patient is not at hand. This woman, though she had a self-induced abortion, was admitted by error to the medical service. As the interne was taking the patient's history he was much surprised to find the skin changing color, so that in a short time, possibly a half hour, the woman's complexion which was light had changed to a deep bronze. The urine had the characterisitics of a hæmaglobinuria: a blood smear showed fragmentary cellular elements, as in the other case, but with streptococci in pure culture. She died some twelve hours after her admission to the hospital. Some 30 hours post-mortem, Dr. Hunter, coroner's physician, made an examination. The body was enormously distended, having more the appearance of a "floater" in hot weather than a recently dead body. The extremities, as well as the cavities were filled with gas. All the structures, practically, had so far advanced in decomposition that their identity could hardly be determined; the leg muscles were a thin grumous fluid. The uterus retained its consistency more than any other organ — it was possible to determine the fact that the cavity contained considerable decidual débris.

The third patient was 30 years of age, who two years before had had a difficult instrumental delivery: the puerperium was complicated with a

sharp gall-stone colic. January, 1914, she had an easy labor, during which for a brief period an obstetric anæsthesia of chloroform was given. For a week previous to her confinement she had an irregular temperature curve, reaching over 102° at least once. During this week she made repeated denial as to pain or tenderness in the hepatic area, though during labor she stated that she had made this denial simply to relieve anxiety on the part of the family; she then admitted she had at times experienced considerable distress directly referable to the gall-bladder. As there was a considerable portion of membrane left, I lightly packed the uterus with gauze, though at this time there was merely the physiologic blood loss. She was returned to bed at 11:30 a.m. About an hour later there was a considerable blood spot on the sheet, though the uterus was contracted. Ergot was given, and morphine gr. 1/6. At 2:15 p.m. there was a rather more severe bleeding, but not an excessive one, and again the uterus was contracted. In spite of the contracted uterus there was a persistence of the bleeding, so I repacked tightly. There had been a slight nick in the perineum which had one silkworm suture for its repair. After the second tamponade, the blood from above not escaping, it was seen that this hardly more than abrasion was oozing persistently. The blood was not the characterisitic red, but more the appearance of a watery port wine. The skin of the patient had not the appearance of exsanguination, but more the bluish-brown of the first patient as the discoloration was disappearing. In spite of horse serum, calcium salts, and stimulants, the patient succumbed at 3:20 p.m. The writer believes that the infective process during the last days of pregnancy, emanating from the biliary tract, was the responsible cause for the failure of coagulation; as events came so quickly it was impossible to obtain specimens of blood and urine for examination, but he believes that the peculiar discoloration of the skin, if the process had not been so fulminating, would have developed into the same type of hæmolysis as the first two.

DISCUSSION

Dr. Mark T. Goldstine: These case reports corroborate what we have done along the line of hæmophilia and hæmorrhage. According to Professor Howell, of Harvard, there is nothing in the blood itself, nor any explanation to be offered on that ground, that would cause these hæmorrhages. They must be due to infection. The only circumstance where we would have a hæmorrhage due to an autohæmolysin in the blood would be in cases of hæmoglobinuria. However, one man has proved in a series of cases that there can be hæmorrhages from the kidney caused by the formation of autohæmolysins in the blood.

Dr. Thomas J. Watkins: As regards coagulation, from what I know of the subject, from personal experience and otherwise, I am convinced that the present methods of testing the time of coagulation of the blood are so uncertain that they are of little or no value. For example: In one girl, who was very much exsanguinated from hæmorrhage of the uterus, due to hæmophilia, the time of coagulation was less than normal. This was a typical case as she had had hæmorrhages from various parts of the body from childhood.

As a uterine pack for hæmorrhages in such cases, our experience with iron gauze has been very satisfactory, as it is a good styptic and can be left for a long time without becoming offensive. Such a pack can be left in the uterus for one week without producing much disturbance.

I presume we all agree that human is better than other blood for injection in such cases.

Dr. Charles E. Paddock: In regard to testing the coagulability of the blood, some one told me a few days ago that he had been experimenting with wire loops; that is, getting one or two drops of blood in a loop, using say half a dozen loops, and by agitation in a certain amount of water and leaving it for a considerable time, then wiping it off, it was found that the blood would usually coagulate very accurately. This is a simple method. It only takes four or five minutes to make the test. I do not know whether there is any one here who is prepared to discuss that method or not. I simply mention it for what it is worth.

Dr. N. Sproat Heaney: Last May I visited Baltimore, and being interested in a particular phase of blood work, I saw Professor Howell, the physiologist, who has done so much work on the coagulability of the blood. From him I learned this: When you remove blood to test its coagulability it must be done by venous puncture. If you cut through tissue and squeeze the tissues, the blood will coagulate more quickly than when it flows freely, because the tissue itself has juices which increase the coagulability of blood. All blood should be removed, first, by venous puncture, whatever the method of testing employed.

Dr. Rudolph W. Holmes: In my report of these three cases I did not say anything about hæmophilia, acquired or congenital, but merely dealt with the question of hæmolysis of infective origin; nevertheless, various men have asked me why I did not test the coagulability of the blood as a routine. For a surgical case it is one thing, as you can set an hour for operation — the evening before would be too soon, but shortly before operation you can test the coagulability of the blood — but to go every day and every few hours to see a pregnant patient with a view to testing the coagulability of the blood would be out of question. We know it varies from time to time during the day, depending upon what a patient has eaten and drunk; it varies also with exercise.

The tampon was not used on account of hæmorrhage primarily, but to remove a considerable portion of membrane left *in utero;* it is better to tampon for retained membranes than to go in the

uterus to remove them manually. When the tampon is removed slowly, later, the separated membranes will come away with the gauze.

A CASE OF PLASMACYTOMA

Dr. Emil Ries demonstrated three sections from a case of plasmacytoma of the ovary.

CARCINOMATOUS RIGHT INTERNAL ILIAC GLAND

Dr. Emil Ries also demonstrated a microscopic section of a carcinomatous right internal iliac gland removed in a case of carcinoma of the uterus.

TORSION OF CORD PRODUCING FŒTAL DEATH

Dr. N. Sproat Heaney: I have here a placenta I want to exhibit because of its rarity. The possibility of the condition is not at all hard to understand, but it is the only case I have seen where, in advanced pregnancy, torsion of the cord produced fœtal death. The patient is forty years of age, pregnant for the first time, after six years of marriage. The pregnancy was normal. On a Friday she felt a violent commotion of the fœtus, and then all motion subsided. The following Monday I could not hear the fœtal heart tones, but was not prepared to say that the fœtus was dead. On Wednesday she gave birth to a macerated fœtus. There is nothing in the history to suspect any systemic cause for the fœtal death. The placenta shows no signs of syphilis. The placenta was born with the cord markedly twisted as you now see it. The strongest twist is at about the middle of the cord, while both the fœtal and the maternal sides are œdematous. Through preservation the œdema was greatly decreased. However, you can see the large number of twists of the cord. As soon as the child was cut loose, the fœtal end was tied to the maternal end of the cord so as to preserve the twists. The baby weighed six pounds two ounces and was within two weeks of expected date of birth.

DISCUSSION

Dr. Holmes: I would like to ask Dr. Heaney what he thinks caused the twist?

Dr. Heaney: When I saw the patient some six or eight weeks before, the fœtus lay transversely with the head to the right. The next time I saw her the parts were turned about, the head on the opposite side, with slight hydramnios.

Dr. Philip S. Doane: Did you notice the position of the child from the time you saw the woman?

Dr. Heaney: Yes, it was transverse when last I saw her before delivery. I interpret the œdema on both sides of the extreme constriction as indicating there was torsion before the death of the fœtus, and that a partially obstructed circulation is what caused the œdema.

Dr. Lynch: When did you see her?

Dr. Heaney: I saw her ten days before labor at the hospital when the fœtus was active. Two days before delivery I saw her in the office, but could not definitely say that the fœtus was dead, the maternal pulse was elevated, and I had a cold. The presentation was longitudinal at labor, whereas before that it was transverse.

Dr. Charles E. Paddock: I believe there are more fatal cases from this cause than we know anything about. This case is rather unique in that the twist or constriction of the blood-vessels is in the center of the cord, whereas, as a general rule, it is either near the umbilicus or placenta, death being caused in that way. There is no doubt but that this twist came on gradually, and then suddenly there was a shutting off of the circulation due to œdema, followed by sudden death of the fœtus. There is a general active movement in these cases at first, and then death. In making a diagnosis of death of the child *in utero* we find there are sudden active fœtal movements, and then a cessation of them. But this case is unusual from the fact that the constriction is in the center of the cord instead of at one end.

Dr. Frank W. Lynch: I think we are looking at a rare specimen. I do not think we very often encounter a cord which is sufficiently tight to cause the death of the fœtus. Dr. Watkins just remarked to me how difficult it is sometimes to tie a cord or constrict a vessel so that it will not bleed. We are able to prove by our microscopic studies that thickness of the cord compresses the circulation.

OBSERVATIONS ON THE OPERATIVE TREATMENT OF SALPINGITIS

Dr. Mark T. Goldstine read a paper entitled "Observations on the Operative Treatment of Salpingitis." (See p. 239.)

DISCUSSION

Dr. Thomas J. Watkins: This paper covers so much ground that it is rather difficult to know just what to discuss. I approve of most that the doctor has said. What he said, however, in regard to the ovary possibly might be discussed. He did not pay much attention to the internal secretion of the ovary. It would seem that the chief reason for leaving the ovaries or ovary if the tubes are removed is because of the internal secretion. Relative to the question of preserving menstruation where the tubes have to be removed: I believe none of us think now that menstruation is of any benefit to a woman, aside from the possible mental effect of it, except it may delay senile changes of the vulva and vagina.

I believe it is pretty generally considered that tuberculous cases are better left alone; that if one finds tuberculosis, it is better to close up than to do any operative work. It is the experience of most operators that they operated on more tubercular cases in their early operative experience than they do now.

As to the question of intestinal adhesions, I am impressed with the fact that it is often better to excise the tube from the uterus and broad ligament before separating the intestinal adhesions. It facilitates the operation and diminishes the danger of injury to the intestine.

Another point which I believe is very valuable is the one of separating adhesions between the inflammatory mass and intestine, which consists in simply squeezing the parts between the fingers instead of separating them, especially where the adhesion is a rather thick one. By squeezing the tissue you can separate the tube without any danger of injuring the bowel.

As to the question of drainage: It would seem to me that the operative technique and time of operation have developed to a point where one thinks it is very seldom necessary to drain. We practically never drain. Drainage then is used, not as a life-saving measure, but to minimize post-operative complications. It very often requires a great deal of judgment to know when one should remove the uterus where the tubes are removed. We probably, all of us, make mistakes as regards removal of the uterus in such cases. It is nearly always possible and advisable to leave some ovarian structure.

DR. CHANNING W. BARRETT: This paper brings up a number of interesting points, most of which are settled in the mind of each operator. I have not come to a definite conclusion that will fit all cases, as the essayist seems to have arrived at. For instance, I see cases in which marked intestinal adhesions will require breaking up. I see cases in which it is necessary to take out some portion of the bowel, as little as we like to introduce the element of intestinal surgery in the case. I see cases in which the tubes have excavated under the sigmoid. I see cases in which it seems entirely permissible to remove one tube and leave the other. I have known such a patient to become pregnant afterward. I have known some to have extra-uterine pregnancy afterward. I see cases in which it seems entirely permissible to take out one tube and leave the ovary on that side, or take out both tubes, and leave both ovaries. We can leave one ovary and one tube on one side, but if the other ovary and tube are matted together they have to be removed.

The point Dr. Goldstine makes with reference to the preparation of the patient is important. The patients who come to the Cook County Hospital do not do so because of moderate disability. They come usually when they are able to do nothing further for themselves, when their condition ceases to be a chronic affair if it ever got to be such, and they come because there is a lighting up of their trouble, with the temperature ranging from 103° to 104°, with some evidence of a local or general peritoneal infection, and rather acute masses present. We have been inclined to put these patients on rest treatment and let the acute symptoms subside, and we are not usually able to let them leave until the temperature has reached normal for eight days, because these patients nearly always go home early, if we let them, and come back in a worse condition; so that we have tried to strike a happy medium of waiting until the temperature has reached normal for a few days; then, a little before they become anxious to go home, we subject them to operation, and then the procedures that have been mentioned are carried out.

As to drainage, sometimes we want to drain because there is too much acuteness to leave out drainage. We sometimes drain because a large oozing surface that is present would furnish quite a little blood, and sometimes we have to drain because weak places are left in the bowel, because the bowel is not in a condition to cover the weak places. I used to drain nearly all cases through the vagina, as the doctor indicated, opening through the vagina by operation through the posterior cul-de-sac and getting in one end of the drain. Of late years I have been more inclined to drain through a stab-wound at the side of the original incision, and we can almost gain a point by getting primary union in the median incision by drainage at the side. We get seemingly better drainage than through the posterior cul-de-sac, as there is not so much disturbance afterward.

The question as to what we are to do with the uterus is to be determined always by the condition in the uterus; not what we have done with the tubes and ovaries, but what needs to be done with the uterus itself. It often becomes necessary to amputate above the cervix and leave a pretty good uterus, as well as to leave an ovary to keep up menstruation. I may say here that menstruation has no effect, except a psychological one, upon the patient, and that effect is very important to the patient herself.

DR. THEODORE J. DOEDERLEIN: There is one point which has not been emphasized sufficiently, and that is the virulence of the poison of puerperal infection.

I recall a sad occurrence in my career of a case in which I considered three points: First, a very virulent poison may be left in the adnexa for years and retain its virulence; second, as to the advisability of conservative surgery; and, third, whether we should permit future pregnancy.

That a virulent poison may remain in the adnexa for years is demonstrated by a case of puerperal infection on which I operated. The patient had become emaciated to a skeleton, and a year after puerperal infection had taken place I operated on her. Then she was a young woman, having had no child, and as she desired to have a child I left one ovary and removed everything else; that is, the other side, and adhesions. The ovary seemed apparently normal. After the operation the woman picked up, gained fifty pounds, and got to be a very healthy woman. After a year she went to California, became pregnant, and wrote me that she was pregnant. I was taken sick at this time and

went to Europe. The physician who took charge of the case for me said she was confined with a living child. The ovary was the seat of an enormous abscess, and ruptured after childbirth, with fatal peritonitis.

We see these cases quite often where there is puerperal infection previous to the secondary flaring up with a subsequent pregnancy, and for that reason I think it is our duty to practice radical surgery or not to allow pregnancy to take place, as shown in this sad case.

With reference to tuberculosis, we have two things to consider: one, tubercular toxæmia, and the other a local tuberculosis. Just a few weeks ago I saw a woman near the climacteric with an enormous metrorrhagia. I opened her up and found a local tuberculosis. I removed the uterus. Another case I had was a case of enormous metrorrhagia and menorrhagia where I did not find any local tuberculosis but a general toxæmia. I removed the uterus with a myoma. Both of these patients picked up and gained in weight. That is my experience as far as tuberculosis is concerned.

Dr. Henry F. Lewis: There is one point that has not yet been mentioned in the discussion, and that is the question of dealing with cystic ovaries. The essayist seemed to me to be unduly concerned as to the danger of leaving cystic ovaries on account of the trouble they make afterward. Perhaps I have not been as much afraid of them as I should have been. In my early operative work I removed a great many ovaries, later I resected them, and now I leave a great many alone that are not in very bad condition.

Another point is with reference to drainage. I see very few cases today in which I think it is necessary to drain. I used to drain nearly all of them. I drained when I was in doubt; later, when I was not in doubt I did not drain; and now there are very few cases I drain at all, regardless of the condition. Perhaps the cases where we need to drain are the acute puerperal cases, but these should seldom be operated on at all.

Dr. William M. Thompson: Regarding the methods of treatment of salpingitis, I recall a peculiar case of double pyosalpinx following pregnancy. The woman had gone through her pregnancy and developed pyosalpinx, as some of these cases do who have vaginal and cervical infection during the parturient period. In speaking of the case to the late Dr. Senn, he asked me what I did, and I told him I packed her in ice and let her alone, and she got apparently well. I think it is a fact that many of these cases, if we had a little more patience with them, put them to bed, gave them proper rest, and practically let them alone for a long enough time or until the whole process subsides, we could watch the tumor gradually disappear. We are then in a much safer condition to attack the disease when the patient has had a good long rest than when the temperature has just subsided.

As to the question of hysterectomy, the late Byron Robinson made a suggestive remark before a meeting of the Chicago Medical Society a year or two previous to his death. The subject of pyosalpinx was under discussion, and Byron Robinson arose and dramatically said, "Double pyosalpinx, hysterectomy," and sat down. That was an extreme view at that time, and yet in a woman approaching the menopause I feel it is a proper procedure.

As to the advisability of leaving the uterus after one of these very damaging double pyosalpinx infections, I have a case in the hospital that I operated upon yesterday in which the question of ileus is hanging over me like the sword of Damocles. This woman had been operated on by a skillful operator. Both tubes were removed with the appendix, and the results were serious adhesions, symptoms of obstruction, and a nasty discharge. The end-results have not been mentioned in this discussion so far. In these very serious cases ileus does follow. We speak of peeling out the entire tube from the pelvis and covering up the raw surface or surfaces. You cannot cover up these raw surfaces in the cul-de-sac unless you take the peritoneum, after removing part of the uterus, and strip it off from the bladder and broad ligaments and stitch it clear back across the rectum and thus cover up the pelvis; in other words, make the pelvis extraperitoneal. When this raw surface is left, following the peeling out of adherent tubes, the lower end of the ileum drops into the cul-de-sac and becomes adherent as it did in the case of which I have just spoken. And so today, after listening to these discussions, the subject of ileus is uppermost in my mind as a post-operative result of pyosalpinx.

Dr. Frank W. Lynch: The remarks of the last speaker (Dr. Thompson) deserve reinforcement. It seems to me, we should be guided in our operation by the chances of subsequent adhesions.

No one has mentioned the procedure of sewing the peritoneum from the bladder to the sigmoid colon as a routine whenever we leave a raw surface. Our results from operating for secondary adhesions are not encouraging. I think one of the strong points the essayist made in his paper was that he leaves intestinal adhesions alone unless there is a chance for obstruction. It seems to me, we should be guided in our treatment of the uterus by the question of the amount of pelvic covering unless there is visceroptosis and a very relaxed abdominal wall. A uterus that is sticking up under the peritoneum, so to speak, with a raw surface to catch the gut, is not a uterus of much use to the ordinary person.

My preference for drainage is very much like that of Dr. Lewis — when in doubt, drain — and I think he has very forcibly emphasized the value of this in the selection of cases. Certainly, all cases of salpingitis should not be operated upon.

Dr. Philip S. Doane: I would like to ask Dr. Goldstine if he has a routine post-operative treatment for these cases.

I think one of the reasons why we are not drain-

ing so much today as we did formerly is that we fear post-operative infection less, and because protoclysis or the use of solutions per rectum will greatly aid us. I would like to hear from him on that point in closing the discussion.

DR. DOEDERLEIN: I would like to ask Dr. Goldstine whether he had many wound infections or stitch-hole abscesses after these operations?

DR. GOLDSTINE (closing): With regard to the first point concerning drainage, I will say that I am draining less and less in many cases. I do not drain as frequently as I used to, and I hope in five years from now to drain but very few; but I think in order not to drain one ought to have a long experience back of him to be able to substantiate his reasons for not instituting drainage. I hope to be able to do away with drainage entirely within a short time.

In regard to pyosalpinx following puerperal infection, the cases that were operated on for pus tubes were operated upon a long time after the infection occurred. We give these cases a good long time to clear up. It is a fact that where we get infection after childbirth, with a large exudate in the pelvis alongside the uterus, the exudate may extend up as high as the umbilicus. If such a patient is kept in bed these exudates will clear up — at least nine out of ten will — and the patients afterward become pregnant.

As to salpingitis, I do not operate every case that comes to me. I feel that there are a number of cases that get well with medical treatment, and I have a pregnant woman now I expect to deliver in whose case I made a diagnosis of salpingitis.

As regards post-operative treatment, it is the regular routine post-operative treatment we all use, I should judge, excepting the patients after they are taken from the operating room to their bedrooms, are made comfortable, perspiration is wiped off thoroughly, hot-water bottles are applied to the feet, and no matter how cold the weather is, the windows are opened wide, the nurse is protected from the cold, and, the patients are covered up well and given all the fresh air they can get. This reduces nausea and vomiting after operation, and patients seem to get along better, and so far I have no reason to change that method on account of post-operative pneumonia.

As regards the other treatment, if patients are in severe pain, we give them morphine hypodermatically to keep them quiet, and we let the bowels rest for forty-eight hours; after that time patients are given from two to three ounces of milk of magnesium as required, and four hours after the last dose, if the bowels have not moved, we give them an enema.

As regards stitch-abscess and distention of the stomach, I have had about everything a practitioner could have post-operative, and I feel that when one operates enough cases he will get all that is coming to him. The cases of acute dilatation of the stomach are the hardest cases I have had to combat, and these occur when you least expect them.

BOOK REVIEWS

A CRITIQUE OF NEW BOOKS IN SURGERY

By MAJOR G. SEELIG, St. Louis

THE present is distinctly an era of efficiency. Ever since Mr. Taylor popularized the idea we have had what practically amounts to an efficiency cult. Brick masons must handle the trowel and mortar just so, ladlers and puddlers, cutters and sewers, fitters and joiners must flex and extend only so often if they hope to turn out the largest amount of product in the smallest allotment of time. The strange fact is that the doctrine of effectiveness has been studied only in its relations to the various industries. Efficiency of act has completely overshadowed efficiency of thought. Of course, this is not so very strange, after all, for action is always tangible, measurable, and concrete, whereas thought is intangible, immeasurable, and elusive. Then, too, most of us associate action with technique, completely forgetting that there also is such a possibility as a technique of thinking. Take book reviewing as an example. The product of the reviewer is worthy or unworthy directly in proportion to the excellence of the technique of thought processes leading up to the final judgments expressed.

All this is apropos the fact that I have been trying to analyze my own technique of book reviewing incidentally to determine why it is so easy to formulate judgments some months and so insufferably difficult at other times. I think the problem stands solved. The books are read in turn, as they come from the publishers. Each volume is allowed full play in its effect on judgment, and each makes its appeal from a different angle. Invariably, however, among the group of books for the month, there is one volume that makes a broader appeal than do the others and in so doing vitalizes criticism. This volume, whichever one it happens to be, serves as a sort of catalyzer, performing its function of fusing and solidifying critical thought, without in any way losing its own identity in the process. When, among the volumes of the month, there is no catalyzer, reviewing is difficult, for then thoughts lag, or at best hang together loosely.

And that is exactly what has happened this month. This first volume,[1] for example, appears so shortly after the publication of a similar volume by Bernheim (reviewed a few months ago in these columns) and the material is so nearly identical with that presented by Bernheim as to take the heart out of constructive criticism. Horsley brings to his task the same essential and excellent qualification that characterized Bernheim's book; namely a familiarity based on personal investigative work of a high order. Concerning this very qualification, one notes with gratification that, although Horsley details, *in extenso*, his own well-worked-out methods of arterial suture, he nevertheless, with excellent judgment, presents all the other important methods.

In this instance, just as in the case of Bernheim's book, we question very seriously the advisability of including too much in the monograph. Of course, varicose veins, varicocele, and hæmorrhoids do group themselves under the head of Surgery of the Blood-Vessels; nevertheless the inclusion of such topics tends to rob the little treatise of some of its essential monographic value; and surely there can be no question that Horsley drives too far afield when he describes and pictures the technique of intestinal anastomosis in a work devoted to blood-vessel surgery.

By a strange irony of fate, all of Horsley's descriptive text bearing on transfusion has been rendered naught by the recent discovery of citrated blood transfusion. This new method, carefully worked out by Lewisohn and Weil, will undoubtedly displace all the other much more technical methods of transfusion. In similar manner, the recently published experiments of Stetten seem to settle very definitely the question of the value of reversal of circulation. One judges that Horsley will readily accept the conclusions of Stetten regarding the folly of reversal, for on page 81 he says, "the practical utility of reversal of the circulation is very doubtful."

One should never lay aside a good monograph without a certain sense of gratitude to both author and publisher for their respective parts in cultivating this highly desirable type of medical literature; so, in the language of Abou Ben Adhem, we say to both Horsley and Mosby, "May your tribe increase."

AND here, at the end of the fiscal year, we have the usual Medical Annual. Only this time we have two of them, one American[2] and the other English.[3] The two volumes are similar in that they

[1] Surgery of the Blood-Vessels. By J. Shelton Horsley, M.D. St. Louis: C. V. Mosby Company, 1915.

[2] The Practical Medicine Series. Vol. II, General Surgery. Edited by John B. Murphy, A.M., M.D., LL.D., F.R.C.S. (Hon.), F.A.C.S. Chicago: The Year Book Publishers, 1915.

[3] The Medical Annual; A Year Book of Treatment. Bristol: John Wright and Sons, 1915.

both are of the A to Z order, therefore defying even approximately detailed critical judgment, and dissimilar, in that the American volume shows, in ways too diverse to classify, the master hand of Murphy, whereas the English volume lacks the coördination that one always misses in a volume edited by thirty odd editors. We have commented before on our own notion regarding the value of Year Books and Annuals. The convictions then expressed still stand, but they stand side by side with a full realization of the fact that an undoubtedly large number of our colleagues have real need for such volumes, and, having need of them, use them to very good purpose.

PYELOGRAPHY as a diagnostic method has been strongly opposed by men expert in renal surgery who feared its dangers and doubted its usefulness; and this difference of opinion has led quite naturally to skepticism and uncertainty on the part of the profession at large, whose final decision in such instances is influenced by the acceptance or denial of the merits of the procedure by those best qualified to judge. With such a situation confronting us, after a trial of ten years, there seemed to be a distinct need of a careful and thorough review of the accumulated data in order to reach some satisfactory settlement.

The appearance, therefore, of a volume on this subject by Braasch[1] is very opportune. The author claims that the injurious results reported in medical literature are due to errors in technique, pointing to his own series of over 1,000 pyelograms without a single mishap as proof of his contention. However, until a less irritating solution is found, or the technique comes under easier control, Braasch would limit its use. "If the diagnosis can be made complete without pyelography its use is contraindicated." Such impartial judgment and conservatism by one who is numbered among the strongest advocates of the procedure must impress the reader forcibly and must lend greater weight to Braasch's conclusions.

Errors in technique, such as back-flow outside of the catheter and incomplete distention, may result in a pyelogram which may simulate in appearance many of the disease processes. Further, the various diagnoses of pathological conditions, as described by Braasch, are based upon variations in outline in the pyelogram which, in a poor plate, may be so obscured that any attempt to differentiate between them would be unjustifiable. Too much emphasis, therefore, cannot be placed upon the importance of the well-tested technique which Braasch advises.

Braasch has realized that the correct interpretation of even a technically perfect pyelogram requires a vast and extensive knowledge of the normal pelvis and the changes in disease, and therefore he has devoted 35 pages, including 46 plates, to a study of the component parts of the normal pelvis and ureter with all their variations in contour and position. Those who may believe the interpretation of a pyelogram to be a simple task, need only read this chapter to be convinced of their error. The variations of the pelvis and calyces are so numerous that lack of acquaintance with the different types might easily lead one to call abnormal a perfectly normal plate. The splendid illustrations and clear comments in this chapter make it much easier for us to follow the deductions in abnormal conditions.

With these normal plates fresh in mind Braasch devotes the following chapters to Abnormal Position, Mechanical Dilatation, Inflammatory Dilatation (including special mention of Tuberculosis), and Stone. The many excellent pyelograms which he presents give far more extensive and exact information than all the other methods in the determination of the presence and the etiology of obstruction and the identification and localization of calculi. Cases of movable kidney and marked angulation of the ureter are shown without any evidence of obstruction in the pyelogram, and Braasch asserts that only where dilatation is demonstrable have we any objective data for operation. In seeking stones, especially, the comparison of the radiogram and the pyelogram in each case is very helpful, and offers far more information than is obtained by the opaque catheter, in that it not only identifies and localizes the stone but also adds more convincing evidence in the demonstration of secondary dilatation. One may well question whether the inspection of the pyelogram alone can distinguish between the mechanical, inflammatory, or tuberculous types of dilatation with the degree of accuracy which is suggested by the author. The differentiation is based upon the regularity of the outline, the club-shaped or flattened ends of the calyces, or an irregular moth-eaten appearance. With such fine points of distinction before us and the realization that an error in a procedure in itself very difficult might produce any of these changes and alter the plate from a regular outline to one irregular, from a club-shaped to a flattened calyx, or a moth-eaten one, it seems only natural to conclude that it is going a step too far at present to grant such accuracy of diagnosis to the pyelogram as the author would have us believe possible. However, the profession must be grateful for the description of these changes and their classification into groups by Braasch. It opens to us a vast field for further study and advance in differential diagnosis.

The interpretation of the pyelogram in cases of early neoplasms and cysts of the kidney may be attended by the same difficulties as in the dilatation group, and a poor plate may be equally confusing. In advanced cases the spider-leg deformity, described by Braasch, seems quite characteristic, but at that stage the pyelogram is rarely needed for diagnosis. The chief advantage of pyelography is shown in the differentiation of a kidney tumor from other abdominal masses.

[1] PYELOGRAPHY (PYELO-URETEROGRAPHY); A STUDY OF THE NORMAL AND PATHOLOGIC ANATOMY OF THE RENAL PELVIS AND URETER. By William F. Braasch, M.D. Philadelphia and London: W. B. Saunders Company, 1915.

In the final chapter, the plates illustrate several forms of congenital anomalies. The frequency of their occurrence with only the slightest symptoms makes the use of the pyelogram all the more valuable. In conclusion we may say that Braasch has settled beyond doubt the distinct advantages of pyelography, and that his careful observations have paved the way for further advance in urological diagnosis. B. M.

THIS recently published textbook on Cystoscopy and Urethroscopy by Lewis and Mark[1] requires little detailed comment. The authors call attention to the rapid advance in these methods of examination and the need of an up-to-date book for beginners; therefore they announce in their preface that the subject of their volume is "to portray the technique of cystoscopy and urethroscopy so graphically that the book might prove of real value to the novice." We are not convinced that they have been eminently successful in their efforts.

The volume is divided into two parts: (1) Cystoscopy, and (2) Urethroscopy. Under each heading the authors describe the technique both of inspection of the bladder and urethra and of operative procedures.

Far too much space is allotted to the presentation of the various types of apparatus needed for the work at hand, and too little to the manner of using these instruments in actual examinations. Furthermore the same tendency to pass lightly over the subject is found in the discussion of the distortion of the images and other difficulties in the interpretation of cystoscopic and urethroscopic pictures. The chief tests of kidney function are given, including a verbatim quotation on the use of phenolsulphonephthalein from a paper of Geraghty and Rowntree; but no attempt is made to compare the accuracy or the limitations of usefulness of these various tests. The chapter on Uretero-Pyelography written by W. F. Braasch, and those devoted by the authors to the diseased conditions in the bladder and urethra are given far better attention, and, although of necessity not elaborate, the text approaches much nearer the ideal instruction that a novice requires.

We fear, however, that the novice who may seek information in this book will criticize the authors for the superficial manner in which they have presented the subject. It does not seem particularly well suited for the use of beginners and offers very few features of value to the more experienced surgeons. B. M.

[1] CYSTOSCOPY AND URETHROSCOPY. For general practitioners. By Bransford Lewis, B.S., M.D., F.A.C.S., and Ernest G. Mark, A.B., M.D., F.A.C.S. Philadelphia: P. Blakiston's Son & Company, 1915.

LET it be said forthwith, this[2] is a good book. It has evidently been written by one who has, out of love and inclination, delved deeply into his subject. The author's statements are clear, simple, and direct. When this much has been said high praise has already been given.

One misses the personal touch that lends charm to the production of clinicians like Osler, Dieulafoy, and Strumpell. The author seems to hold himself modestly in the background, a virtue which in an author of a textbook on a clinical subject easily becomes a failing. Thus, Aaron, in discussing carcinoma of the stomach, recites Salomon's test, Wolff and Junghan's test, Loeper and Binet's cystodiagnosis, Neubauer and Fischer's glycyltryptophan reaction, Gluzinski's test, and fails to give us an appraisal of these methods, based either on his own experience or on reports of others.

The book is a large one of almost 800 pages, bulky in fact, but there are omissions that seriously mar its usefulness to the general practitioner, for whom, according to the preface, it is intended. In his chapter on examination of the fæces, Aaron makes no mention of the test for urobilinogen in the urine as an indication of the presence or absence of bile in the intestines; yet it is simpler and easier than Schmidt's sublimate test and fully as reliable. The relation of the endocrine glands and their secretions to diseases of the gastro-intestinal tract receives but scant notice and one misses a short discussion, at any rate, of the diarrhœa in Basedow's and Addison's diseases.

One more shortcoming deserves mention because it characterizes so many of the clinical treatises of today; namely, the tendency to dogmatize and schematize. As an example, witness the chapter on Chronic Constipation: first, a short definition that falls far short of the mark, then at once a subdivision into three varieties — atonic, spastic, fragmentary. This is the sort of thing that leads students to believe that Dame Nature has studied medicine in one of our leading schools and acts accordingly. Schmidt says, "A sharp dividing line cannot be drawn between atonic and spastic constipation," a statement that makes us feel that here is a man who appreciates the complexity of the situation.

Still, it is a good book. When we say that it must be read with some discrimination, we only say what must be said of most efforts of this kind. That textbook which can be read from one end to another and its contents accepted *in toto* is as rare as is the man with catholic mind to produce it. L. S.

[2] DISEASES OF THE DIGESTIVE ORGANS, WITH SPECIAL REFERENCE TO THEIR DIAGNOSIS AND TREATMENT. By Charles D. Aaron Sc.D. M.D. Philadelphia and New York: Lea & Febiger, 1915.

CORRESPONDENCE

A NOTE OF THANKS FROM DR. DEPAGE

To the Editor: I enclose herewith the literal translation of a letter I have just received from Dr. Depage, which he wishes to have published in acknowledgement of the many letters he has received from America since the tragic death of Madam Depage on the "Lusitania."

R. H. HARTE.

Philadelphia.

The translation of Dr. Depage's letter follows:

My dear Colleagues: I have received from a large number of you and notably from the committees which you have formed, the most touching tributes of sympathy and of condolence for the catastrophe of the "Lusitania" in which my wife lost her life.

These tributes are so numerous and so unanimous that I wish to express to you publicly my appreciation of them. I address myself to you, my dear Colleagues, as the authorized representatives of the humanitarian sentiments which so honor the great American nation.

You all know, as I wrote to you when my wife left for America, for what purpose she accepted the mission which the Red Cross confided to her. In the presence of the unexampled miseries of which we have been the prey, she had resolved to solicit your fraternal assistance. You gave her that largely — I should say "joyously" if the word could be used in these times.

The letters my wife wrote to me in the course of her mission told me how you worked for her, and revealed to me the extent and generosity of your projects for our wounded. Your hearts were open to our appeal; your Country did not wait to come to our assistance. Powerful America wished to take under her protection our little people, tortured but always valiant.

My great sorrow does not permit me to reply as I wish I might to each one of you. Only today have I been able to measure — thanks to the letter of your compatriot, Dr. Houghton — the extent of the gratitude I owe, to him, first, for having risked his life in trying to save that of my wife, and after that to you all for your devoted help in our common work.

Under the strain of my emotion, the sentiment of thankfulness is the only one to which at this moment I am able to give expression. Permit me to do so with all my heart.

A. DEPAGE.

La Panne, Belgium.

THE BUTTON SUTURE IN COLPORRHAPHY

To the Editor: In the May issue of SURGERY, GYNECOLOGY AND OBSTETRICS Dr. S. F. Wilcox describes what he calls "The Button Suture" in anterior colporrhaphy. This method is identical with the method described by me in my book *The Principles of Gynæcology*, in 1910, and also in the *Journal of Obstetrics and Gynæcology of the British Empire*, in 1911. Dr. Wilcox has made a slight variation in the use of pearl buttons threaded on the mattress sutures. I doubt, however, whether he can claim that such a slight and unnecessary alteration constitutes a new procedure. The principle of the method is the important matter, and that was introduced by me, as already indicated.

W. BLAIR BELL.

Liverpool, England.

Clinical Congress of Surgeons of North America

SIXTH ANNUAL SESSION

BOSTON

OCTOBER 25 TO 29, 1915

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THE HOSPITALS AND MEDICAL SCHOOLS OF BOSTON

III.—Tufts College Medical School

By CHARLES F. PAINTER, A.B., M.D., F.A.C.S., Dean

TUFTS College, situated in Medford, Mass., was founded in 1852. At that time its charter authorized the trustees "to confer such degrees as are usually conferred by colleges in New England." It was originally a college of letters, but in its endeavor to adapt itself to the needs of the section of the country it has sought to serve, it now confers the following degrees: Bachelor of Arts, Bachelor of Philosophy, Bachelor of Science, Master of Arts, Doctor of Philosophy, Civil, Mechanical, and Electrical Engineer, Bachelor of Divinity, Doctor of Medicine, and lastly, Doctor of Dental Medicine.

Started under the auspices of the Universalist Church, it never has been a sectarian institution, and in coming into existence under denominational auspices it was simply following the tradition of many of its predecessors among New England colleges.

It is a coeducational college; in this regard again attempting to meet the public demands, when in 1892 it established Jackson College for women students. The coeducational feature has extended to the professional schools.

In the fall of 1893, Tufts College inaugurated a medical department, the first session of which was held that year in the building at 188 Boylston Street. This action was the result of some deliberation on the subject by the trustees of the college, who recognized the fact that a medical school, coeducational in nature, of high standard, moderate in charges, and located in Boston, where hospital facilities were to be obtained, was a necessity to New England. The step, however, was not taken without some misgiving because of the financial crisis of that period and the lack of endowment to aid in the establishment of a medical school in connection with this college. The location on Boylston Street, which the school occupied during its opening years, was hardly all that could be desired for such an institution. The corps of instructors numbered barely twenty-five, the resources, the room, and the materials to work with were very limited, but the opening class was of a large size and the prospects of steady increase seemed good. The course was a three-year one and the subjects taught were those of the usual medical school.

The following year found the school still in the same quarters, which, however, had been greatly enlarged. There had been an increase in the number of instructors and improved clinical advantages. The number of students this year was greatly in excess of that of the preceding year. Gratifying as these results were, they necessitated the seeking of a larger home in which to carry on the work of the school.

In 1896 negotiations were opened and the necessary steps taken to install the school in a large building formerly the property of the First Free Baptist Church, located on the corner of Rutland Street and Shawmut Avenue. In the meantime, as temporary headquarters, the Chauncey Hall School building was rented; which place was occupied until the following year, when the school opened in its new building. This was a large stone structure fronting on three streets, containing some 15,000 feet of floor space arranged in lecture rooms, laboratories, dissecting and study rooms of the most improved description.

In the preceding year many radical changes had been inaugurated; the course was modified from a three- to a four-year one; a new dean was chosen, the faculty and corps of instructors greatly increased, and many other important steps taken which the growth of the school demanded. Here then for four years the school was located, each succeeding year bringing improvements in the curriculum, increased facilities for study and more ability to the ranks of the faculty. The rolls of the classes, too, showed an increase keeping pace with the improvements, and even outstripping them, until it became apparent that another move into still larger quarters was necessary in order to accommodate the unprecedented growth of the school.

This step was made all the more necessary by the fact that in the year 1899 the Boston Dental College became, under a special act of the legislature, an incorporate part of Tufts College. This transfer was the result of new laws of the state concerning the study of dentistry, which made it necessary that a dental school should have some connection with one of medicine. Therefore the work of the two schools became blended, with an increased strain on the resources and facilities found at the medical school building. In the meantime various steps were taken

to find a new situation for the two schools. After some consideration land was purchased upon the corners of Huntington and Rogers Avenues, Courtland and Driscoe Streets, the ground being broken for the new medical school building early in the autumn of 1900.

This building was occupied in the session 1901–02. Increasing requirements again necessitated more commodious quarters, and in 1910 the building was enlarged and remodeled at an expense of $50,000. A fourth story was added, and the building is now equipped with every needful facility for teaching medicine in accordance with present requirements.

The faculty and board of instructors is composed now of about one hundred and ten members. The laboratory courses take the entire time of the professors giving instruction in those subjects.

The necessity for large endowment in order to put the clinical instruction upon full time basis, as well as some question as to the advisability of so doing to any considerable extent, has kept the school from even considering entrance upon this experiment. The enrollment in the school is slightly better than three hundred students on the average. The tuition fees have been kept as low as has been consistent with giving good advantages to the student both in scientific and clinical subjects.

This and certain tendencies in the shaping of the curriculum of the school have been dictated largely by the desire to lay emphasis in the instruction upon the training of general practitioners, more than upon that of highly trained specialists. The latter are desirable and necessary, but the two can not be advantageously carried on in the same courses. There is much that must be taught to the highly trained research man that the physician in general practice in the rural districts need know nothing about. The cost of giving him instruction along these lines is high, particularly so when the value of much of it to the science of medicine is problematical, and for this particular class of practitioner it is useless.

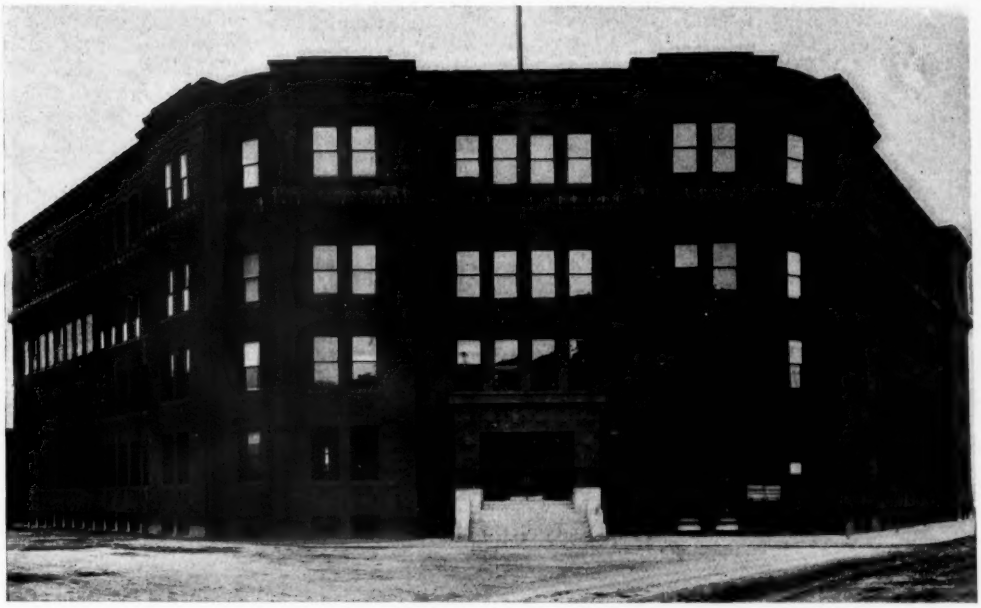
In meeting the increased educational requirements for entrance upon the study of medicine, the trustees have authorized the giving of a premedical course of one year of college work in biology, physics, chemistry, and either French or German. These courses are given at the medical school. The faculties of the medical, arts, and scientific departments of the college have united to aid in the conduct of these courses in order that the student may lose nothing of the advantage of a college course in these subjects, and may, at the same time, have his premedical year bear as practically as possible upon the subjects to be pursued later in the medical school and in practice. The language courses are designed to enable men to read scientific French and German, which the average college graduate can not do by the time he has entered upon the practice of medicine without post-graduate study. Physics and chemistry have been similarly modified from the manner of giving them ordinarily in the college of arts, that they may interest the prospective medical student in the practical applications of those sciences to the problems of medicine.

In the minds of those who have given these courses so far, there is no doubt of the practicability of conducting them in this way. There is nothing pedagogically wrong in this plan when handled by the combined faculties of an arts college and its medical department.

The administration of the professional affairs of the school is vested in two committees, chiefly. One is the administrative committee, acting as an intermediary between the faculty and the trustees and dealing with appointments and the budget largely. The financial affairs of the school are administered from the office of the trustees of the college. Matters relating to the arrangement of the curriculum, details of the student's relations with the school work, admission requirements, etc., are handled by a committee on instruction, composed of a representative from each of the six departments into which the work of the school is divided. Full faculty meetings are held only three or four times during the year unless especially called.

A brief statement of the general organization and plan of instruction in the six departments of the school's activities follows.

The departments of anatomy, histology, and pathology act as a unit in the committee work of the faculty. For many years the teaching of these subjects and all others of the first two years has been upon the concentration plan, but a year or more ago, now, the faculty voted to return to the older method under which the subjects of these two years were taught throughout their respective years; the reason for this return to the older method being that a better correlation of the subjects taught can be secured in this manner. When this plan is completely in operation, anatomy will continue through the entire first year, as will also histology. The former will continue into the second year as topographical anatomy, where it will be correlated with



Tufts College Medical School Building

beginning courses in medicine and surgery, to which it will be a helpful adjunct.

Pathology commences in the second year and when the concentration method is over will run through the year as a laboratory and lecture course, and be carried into the third and fourth years as a demonstration course in conjunction with the department of medicine. Histology and embryology are completed at the end of the first year.

This department, represented by its faculty members and instructors, as do all other departments under similar departmental organization, meets to discuss its own particular problems of instruction and annually chooses one of its faculty members and an alternate to make up the important committee on instruction.

The biology teaching of the premedical year is carried on by the professor of histology in conjunction with the biological department of the college of arts. The departments of chemistry, physiology, pharmacology, and therapeutics are organized under one unit and so represented on the committee of instruction.

Physiology will be taught through the entire first year running parallel with descriptive anatomy. The general chemistry of the premedical year, as well as the physiological chemistry, is handled by the professor of chemistry. The latter course will begin in the second semester of the first year and will be completed at the end of the first semester of the second year. The first part is physiological chemistry; the second is chemical pathology and toxicology. In this way the subject is brought to the students' attention at a time when it can be related to his physiological studies on the one hand, and the commencement of some of his distinctively medical studies on the other.

Pharmacology is commenced in the second year as a lecture and laboratory course. The amount of time and expense involved in conducting an elaborate course in experimental pharmacology has never seemed to be justified by any practical value it might have to a general practitioner, so the emphasis is laid elsewhere in the conduct of the courses in this subject. A course in applied therapeutics is arranged for the third and fourth year students, and is given at the Robert Brigham Hospital. Practical therapeutics is taught at Tufts in a way which we believe is different from that of any of the other medical schools. Therapeutics is usually given in the department of clinical medicine. It is taught at the bedside incidental to instruction in symptomology and etiology. There are, nevertheless, certain gen-

eral principles back of the many and often confusing details of treatment upon which these details are based. The course in applied therapeutics at Tufts deals with these general principles of treatment and is intended to bridge the gap between the sciences of physiology, chemistry, pharmacology, etc., upon which treatment is based, on the one hand, and the actual details of treatment on the other hand. Small groups of the third and fourth year students who have already had some instruction in clinical medicine are given instruction in therapeutics, chiefly at the bedside in a large well equipped modern hospital caring for a great variety of cases. The details of treatment in individual cases as shown by the records are discussed, but emphasis is laid especially on the general principles upon which the treatment is based. This is demonstrated by bringing out the fact that though different physicians are responsible for the treatment shown in different cases, and there may therefore be differences in certain details of treatment,— differences relating to the particular drugs used, the size of dose, and even more important factors,— yet certain common principles of treatment are used by all of them. The patients are seen from day to day, to show the actual effect of different forms of treatment in individual cases. The course serves as an introduction to the general principles of applied therapeutics, and is intended to make the subsequent bedside teaching of the details of therapeutics more intelligible. Since students study medicine for the purpose of learning to treat sick patients, the subject of applied therapeutics is at least — theoretically — the most important in their course; the practical purpose of pathology, physiology, diagnosis, and the fundamental science is to help treat the patient.

The department of medicine plans to commence its work with the students in a very elementary way in small sections during the second year, when four or five men are assigned to one of the district physicians of the Boston Dispensary and make rounds at the homes of patients, when they are given their introduction into the practical observation of patients, with especial reference to conducting an examination and obtaining a history. This is correlated with other practical and didactic teaching of auscultation and percussion. In the third year the course consists chiefly of clinical lectures and bedside hospital visits, with didactic lectures in theory and practice. The fourth year has fewer clinical lectures and more small section assignments to outpatient departments and clinical clerk positions in hospital wards. Under the general division of medicine come the special branches of neurology, neuropathology and mental diseases, hæmatology, and pediatrics.

The department of surgery covers the subjects of surgery, clinical surgery, genito-urinary diseases, rectal diseases, and orthopedic diseases. The department plans to take the students in small sections in their second year in a manner similar to that described under medicine, and at the Relief Hospitals give them practical work in anæsthesia, requiring a certain number of cases of each student, bandaging, and the application of the principles of antisepsis and asepsis to the dressing of simple wounds. In the third year the work is in clinical lectures as a class and ward work in sections. Surgical pathology will be brought to their attention in this year as a special laboratory and demonstration course. In the fourth year, lectures and section work in the out-patient and hospital wards will be carried on. A course in operative surgery on the cadaver in the fourth year tends to keep the students' anatomical knowledge from becoming rusty.

The department of obstetrics and gynecology is represented in the committee on instruction in alternate years by the heads of the respective departments. Obstetrics is taught throughout the third year, each student having opportunity for the practical part of the subject, and a sufficient amount of practice in operative obstetrics is afforded. The gynecological department gives instruction in sections in clinics and a series of didactic lectures in the third year.

The department of the specialties is represented in the same way that the other departments are represented in the committee on instruction, that is, by election of a representative from the different divisions, and an alternate. Under this group come dermatology, ophthalmology, otology, and laryngology. In all these specialties the teaching consists of a lecture course covering the essential parts of the subject, supplemented by clinical instruction designed to enable the student to familiarize himself with the commonest examples of lesions peculiar to the different subjects.

The school has not taken the position, as yet, of requiring a hospital year. Such a stand does not seem a feasible one at present; neither does it appear to be necessary, for during the past four or five years ninety per cent or more of our graduating class have secured hospital appointments in a metropolitan hospital, or in some one of the many excellent small cottage hospitals in the vicinity of Boston.

PRELIMINARY CLINICAL PROGRAM FOR BOSTON MEETING

MASSACHUSETTS GENERAL HOSPITAL

Monday

C. A. PORTER — 9. Operations: Goiter, cancer of stomach.
D. F. JONES — 9. Operations: Cancer of rectum (first stage).
R. C. CABOT, HUGH CABOT, and OSCAR RICHARDSON — 10. Demonstration: Comparison of clinical evidence with post-mortem findings.
HUGH CABOT et al — 2. Operations: Epididymectomy for tuberculosis, litholapaxy for stone in bladder, ureterotomy for stone.
C. L. SCUDDER — 3. Demonstration: Fractures.
HUGH WILLIAMS — 3. Demonstration: Cases.

Tuesday

E. G. BRACKETT and R. B. OSGOOD — 9. Operations: Excision of knee, with bone plates, exploration of knee joint through median incision.
D. L. EDSALL — 10. Clinic: Border-line cases.
C. L. SCUDDER and H. F. HEWES — 10. Demonstration: Diagnosis and treatment of chronic gastric ulcer.
G. W. W. BREWSTER — 2. Operations: Hysterectomy for fibroids, appendectomy.
LINCOLN DAVIS — 2. Operations: Ureterotomy for stone, hysterectomy.
ROGER I. LEE and BETH VINCENT — 2. Demonstration: Splenectomy for pernicious anæmia.
C. C. SIMMONS — 3. Demonstration: Osteomyelitis.
G. A. LELAND, JR. — 3. Demonstration: Anthrax.

Wednesday

F. G. BALCH — 9. Operations: Prostatectomy, abdominal tumor.
R. B. GREENOUGH — 9. Operations: Benign tumor of breast, cancer of breast.
Z. B. ADAMS, M. S. DANFORTH, and C. H. BUCHOLZ — 10. Demonstration: Scoliosis.
L. T. BROWN — 10. Demonstration: Postural defects.
FARRAR COBB — 2. Operations: Hysterectomy for cancer (Wertheim).
HUGH WILLIAMS — 2. Operations: Gall-bladder.
R. C. CABOT, HUGH CABOT, and OSCAR RICHARDSON — 3. Demonstration: Comparison of clinical evidence with post-mortem findings.

Thursday

HUGH CABOT et al — 9. Operations: Nephrectomy for tuberculosis, pyelotomy for stone, prostatectomy.
R. C. CABOT — 10. Clinic: Border-line cases.
ABNER POST — 10. Demonstration: Congenital syphilis.
E. G. BRACKETT and R. B. OSGOOD—2. Operations: Open operation on hip, gig-saw osteotomy of knee joint.
C. A. PORTER, A. K. STONE, H. F. HEWES, and J. B. HARTWELL — 3. Demonstration: Tuberculous cervical adenitis.
W. J. MIXTER — 3. Demonstration: Fracture of the skull.

Friday

C. L. SCUDDER — 9. Operations: Duodenal ulcer, cancer of stomach, fracture of femur.
R. B. GREENOUGH — 9. Operations: Cancer of jaw, tongue, or lip.
J. C. WARREN — 10. Demonstrations: Reminiscences of the discovery of ether.
C. A. PORTER — 10. Demonstration: Cases.
R. H. MILLER — 10. Demonstration: Tetanus.
C. A. PORTER — 2. Operations: Tuberculous cervical adenitis, operation on peripheral nerve.
D. F. JONES — 2. Operations: Cancer of rectum (second stage).

Surgical Specialities

A. COOLIDGE, J. P. CLARK, H. P. MOSHER, D. C. GREENE, W. F. KNOWLES, H. A. BARNES, C. ROBBINS, and F. E. GARLAND — Eye, ear, nose, and throat clinics, daily.
G. H. WRIGHT — Demonstrations in oral surgery.
J. L. GOODALE — Demonstration: The diagnosis and desensitizing of hay fever.

BOSTON CITY HOSPITAL

Monday

J. B. BLAKE, W. E. FAULKNER, and L. R. G. CRANDON — 9. Operations: Surgical.
F. S. NEWELL, E. B. YOUNG, and N. R. MASON — 2. Operations: Gynecological.
G. P. SANBORN — 3. Demonstration: End results in the tuberculin treatment of lymphnodular tuberculosis.
F. W. WHITE, F. B. LUND, and R. D. LEONARD — 4. Demonstration: Diagnosis and treatment of ulcer and cancer of the stomach (medical, surgical, X-ray).

Tuesday

F. B. LUND, F. J. COTTON, and D. D. SCANNELL — 9. Operations: Surgical.
PAUL THORNDIKE and assistants — 2. Operations: Genito-urinary.
PAUL THORNDIKE — 3. Demonstration: Prostatectomy, renal calculus.
HORACE BINNEY — 4. Demonstration: Treatment of tumors of the bladder with the high-frequency current.

Wednesday

E. H. NICHOLS, H. A. LOTHROP, and J. C. HUBBARD — 9. Operations: Surgical.
J. B. BLAKE, W. E. FAULKNER, and L. R. G. CRANDON — 2. Operations: Surgical.
J. B. BLAKE — 3. Demonstration: Splenectomy for Banti's disease.
A. R. KIMPTON — 4. Demonstration: Transfusion by the use of glass cylinders, bone tumors, resection of the stomach for sarcoma.

Thursday

PAUL THORNDIKE and assistants — 9. Operations: Surgical.
F. B. LUND, F. J. COTTON, and D. D. SCANNELL — 2. Operations: Surgical.
F. J. COTTON — 3. Demonstration: Artificial impactions in fracture of the hip, joint affections, separations of the lower epiphysis of the femur.
F. B. LUND — 4. Demonstration: Results of operative treatment of fractures, particularly with Parham and Martin bands.

J. H. CUNNINGHAM — 4:30. Demonstration: Congenital cystic kidney, results of operations for intestinal tuberculosis, nephrectomy for acute unilateral hæmatogenous infections of the kidney.

F. H. LAHEY — 5. Demonstration: Cardiospasm, carcinoma of the jejunum, resection of the rectum with perineal anus.

Friday

F. S. NEWELL, E. B. YOUNG, and N. R. MASON — 9. Operations: Gynecological.

E. H. NICHOLS, H. A. LOTHROP, and J. C. HUBBARD — 2. Operations: Surgical.

E. H. NICHOLS — 3. Demonstration: Results and methods of operating for osteomyelitis, cerebral surgery.

H. A. LOTHROP — 4. Demonstration: A new operation on the frontal sinus.

J. C. HUBBARD — 5. Demonstration: Sarcoma of the femur, excision of the transverse colon, perforation of duodenal ulcer, transverse duodenal removal of a gallstone, rupture of the liver.

In connection with the operative clinics, demonstrations of special methods of anæsthesia — intratracheal, spinal, etc.— will be given, where possible, by J. E. BUTLER, F. L. RICHARDSON, and N. N. MORSE.

CHILDREN'S HOSPITAL

Orthopedic Department

R. W. LOVETT, A. THORNDIKE, ROBERT SOUTTER, A. EHRENFRIED, A. T. LEGG, J. W. SEVER, and HENRY J. FITZSIMMONS — Daily, 9 to 11. Orthopedic operations: Reduction of congenital dislocation of the hip by various methods, and especially by a special machine; tendon transplantations, capsule reefing, etc., in infantile paralysis, the use of silk ligaments in infantile paralysis; the operative correction of club foot; the Hibbs and Albee operations for tuberculosis of the spine; the operative treatment for spastic paralysis; operations for coxa vara; bone transplantations.

R. W. LOVETT — Monday, 2:30 and 5:10. Demonstration: The treatment of infantile paralysis by muscle training, with exhibition of patients. The treatment of scoliosis by forcible jackets. Application of jackets and demonstration of results.

ROBERT SOUTTER and A. T. LEGG — Monday, 3:15. Demonstration: Exhibition of the results of the operative treatment of infantile paralysis.

E. G. MARTIN — Monday, 3:30. Demonstration: An apparatus to determine the strength of muscles affected by infantile paralysis, with conclusions to be drawn from observations made by it.

J. J. THOMAS and J. W. SEVER — Monday, 4. Demonstration: Obstetrical paralysis and fracture of the acromion process simulating it.

Monday, Tuesday, and Wednesday, 3. Demonstration: Treatment of paralysis by muscle training.

A. THORNDIKE — Monday, 4:30. Demonstration: End-results in osteoplastic operation for spinal tuberculosis.

PERCY BROWN — Monday, 4:50. Demonstration: Röntgen results in osteoplastic spinal operations.

Thursday, 4. Demonstration: Result of röntgen investigation in cases of fibrous stenosis of the pylorus in children.

Daily, 10 to 4. Exhibition of röntgenograms, röntgen department.

ROBERT SOUTTER — Thursday, 3. Operation: A new operation for flexion contraction of the thigh in infantile paralysis.

A. T. LEGG — Thursday, 3:30. Operation: Transplantation of the origin of the pectoralis major muscle in paralysis of the shoulder.

A. EHRENFRIED — Thursday, 2:30. Demonstration: Multiple enchondroma.

H. J. FITZSIMMONS — Monday, Tuesday, and Wednesday, 3. Demonstration: Treatment of scoliosis with methods in use; cases and records.

Thursday, 4:20. Demonstration: Apparatus for reduction of congenital hip dislocations.

PROFS. ERNST, FOLIN, HUNT, CANNON, and WOLBACH, DRS. STONE and MORSE — Thursday, 4:30. Clinic: Infantile paralysis.

Visit to orthopedic wards daily, 11 to 12. The new hospital buildings will be open to inspection by visitors daily, 9 to 10.

Surgical Department

J. S. STONE, W. E. LADD, C. G. MIXTER, and T. W. HARMER — Daily, 11 to 1. Surgical operations: Harelip, cleft palate, empyema, hernia, cervical adenitis, webbed fingers, hypospadias, undescended testis, etc.

C. G. MIXTER — Tuesday, 2:30. Demonstration: Imperfect and ectopic anus.

Wednesday, 2:30. Demonstration: Tuberculous peritonitis; pyloric stenosis; undescended testis.

W. E. LADD — Tuesday, 2:30. Demonstration. Cervical adenitis.

Wednesday, 2:30. Demonstration: Intussusception; harelip and cleft palate.

J. S. STONE, W. E. LADD, and J. J. THOMAS — Tuesday, 2:30. Demonstration: Fractures in children, subperiosteal and epiphyseal, elbow joint fractures, Volkman's ischæmic contractures.

J. S. STONE — Wednesday, 2:30. Demonstration: Some obscure abdominal conditions; empyema, harelip, and cleft palate, acute epiphyseal lesions.

T. W. HARMER — Wednesday, 2:30. Demonstration: The treatment of birthmarks.

PROFS. ERNST, FOLIN, HUNT, CANNON, WOLBACH, DRS. LOVETT, STONE, and MORSE — Tuesday, 4:30. Clinic: Cervical adenitis.

DRS. CROSBY, GREENE, and F. E. GARLAND, three afternoons. Eye, ear, nose, and throat clinic.

Visit to general surgical wards daily, 10 to 11.

MASSACHUSETTS HOMŒOPATHIC HOSPITAL

Monday

A. G. HOWARD and H. MOORE — 9. Orthopedic operations: Bone grafting, tendon transplantation.

J. H. PAYNE and D. W. WELLS — 9. Eye operations: Advancement, pulley stitch; advancement, modified Worth; ptosis, Tansley operations; trephining, glaucoma.

DRS. RICE, HOUGHTON, and C. SMITH — 2. Operations: Nose and throat.

W. F. WESSELHOEFT and T. E. CHANDLER — 2. General surgical operations: Gastric ulcer, ventral hernia, inguinal hernia, appendicitis, œsophageal diverticulum.

Tuesday

J. E. BRIGGS and C. T. HOWARD — 9. General surgical operations: Prostate, appendix, goiter, inguinal hernia.

G. A. SUFFA and A. W. HORR — 9. Eye operations: Muscle tucking; advancement, modified Worth; cataract extraction; glaucoma.

HORACE PACKARD and C. T. HOWARD — 2. General surgical operation: Appendectomy, a simpler method of sealing the appendicular stump. Demonstration cases: Prostatectomy, the choice of routes; the control of post-operative hæmorrhage, illustrative operations; empyema, cases for demonstration; enteroptosis, cholelithiasis.

DRS. RICE, HOUGHTON, and SMITH — 2. Operations: Nose and throat.

Wednesday

DRS. RICE, HOUGHTON, JOHNSON, SMITH, and BUSH — 9. Operations: Nose and throat.

GEORGE H. EARL and H. MOORE — 9. Orthopedic operations: Congenital dislocation of the hip, bone-grafting, tendon transplantation.

W. F. WESSELHOEFT and R. C. WIGGIN — 2. General surgical operations: Nephrolithiasis.

F. W. COLBURN — 2. Operations: Ear.

Thursday

J. E. BRIGGS and C. Crane — 9. General surgical operations: Cancer of the breast, appendix, cholelithiasis, nephrolithiasis.

DRS. RICE, HOUGHTON, and C. SMITH — 9. Operations: Nose and throat.

G. R. SOUTHWICK — 2. Gynecological operations: Ovarian cystomata, retrodisplacement of uterus, uterine fibromata, perineorrhaphy.

Friday

G. R. SOUTHWICK and D. G. WILCOX — 9. Gynecological operations.

DRS. A. S. BRIGGS, BOYD, LEE, SEDGELEY, SOUTHER, and THOMAS — 2. General surgical operations.

Demonstrations

W. H. WATTERS — Surgical pathology.
G. A. SUFFA — Ophthalmotrope.
Routine examination of ante-partem cases — Wednesday, 10.
Social service clinic for post-partem cases — Thursday, 2.
Daily clinics in twilight sleep.
Daily exhibition of new maternity building.

PETER BENT BRIGHAM HOSPITAL

HARVEY CUSHING — Daily. Clinics or demonstrations: Surgery of the brain, pituitary body, spinal cord, peripheral nerves.

DAVID CHEEVER and JOHN HOMANS — Daily. Operations: Surgical.

HENRY A. CHRISTIAN, CHANNING FROTHINGHAM, and others of the medical staff will coöperate in giving clinics or demonstrations on selected topics, such as the electrocardiogram, etc.

FREE HOSPITAL FOR WOMEN

DRS. GRAVES, PEMBERTON, WADSWORTH, HUTCHINS, and BAKER — Tuesday, Wednesday, and Thursday, 9. Operations: Gynecological.

DR. PEMBERTON — Wednesday, 2:30. Cystoscopic demonstration.

DR. HUTCHINS — Thursday, 2:30. Demonstrations: Laboratory specimens.

ST. ELIZABETH'S HOSPITAL

DRS. LANE and SUPPLE — Monday and Thursday, 9. Operations.

DR. M. J. CRONIN — Monday, Thursday, and Friday, 10. Ward visit.
Wednesday, 9. Intravenous salvarsan injections.

DR. T. F. BRODERICK — Tuesday, 9. Orthopedic operations and clinic.

DR. A. L. CHUTE — Wednesday and Friday, 9. Operations: Genito-urinary.

DRS. BRAINERD and HOLMES — Tuesday, 9. Nose and throat clinic.

DR. A. F. DOWNING — Monday and Friday, 11. Demonstrations: Laboratory technique.

DR. P. F. BUTLER — Tuesday and Thursday, 10. Demonstration: Radiography.

DRS. MCDONALD and MCADAMS — Wednesday, 10. Eye clinic.

The history, diagnosis, and indication for operation in each case will be discussed previous to operation by Dr. Cronin of the medical service and Dr. Butler of the röntgenological department.

ROBERT BRIGHAM HOSPITAL

CHARLES F. PAINTER, EDWARD RICHARDSON, LLOYD T. BROWN, and RICHARD MILLER — Tuesday and Thursday — 10. Operations.
Monday, Wednesday, and Friday, 3. Clinics: Surgery of chronic diseases, arthritis, intestinal tuberculosis, peritoneal adhesions, hæmolytic diseases.

NEW ENGLAND HOSPITAL FOR WOMEN AND CHILDREN

MARY A. SMITH and ABBY M. O'KEEFE — Monday and Thursday, 10. Operations: Gynecological.

ELIZABETH T. GRAY and LETITIA D. ADAMS — Monday, 2; Tuesday, 10. Operations: Gynecological.

EMMA B. CULBERTSON and GLADYS COOPER — Tuesday and Friday, 2. Operations: Gynecological.

FLORENCE DUCKERING and LETITIA D. ADAMS — Wednesday, 10.
Thursday, 2. Operations: Gynecological.

MAUDE CARVILL — Thursday, 2. Eye clinic.

MARGARET NOYES — Wednesday, 2. Ear, nose, and throat clinic.

ISABELLE D. KERR — Friday, 10. Ear, nose, and throat clinic.

Scopolamine-morphia anæsthesia both with and without ether will be used during these clinics. Statistics, covering six years' continuous use of this form of surgical anæsthesia, on over 1,400 cases, are available. Dr. Abby M. O'Keefe, professional anæsthetist, has entire charge of this department.

LONG ISLAND HOSPITAL

F. H. LAHEY — Monday, 2. Operations.

J. H. CUNNINGHAM — Tuesday and Wednesday, 2, Operations.

ROBERT SOUTTER — Thursday and Friday, 2. Operations.

CARNEY HOSPITAL

J. T. BOTTOMLEY and D. F. MAHONEY — Monday, Wednesday, and Friday, 9. Operations: Surgical.

W. R. MACAUSLAND and A. R. MACAUSLAND — Monday, Wednesday, and Friday, 9. Operations: Orthopedic.

F. W. JOHNSON and S. RUSHMORE — Tuesday and Thursday, 9. Operations: Gynecological.

CODMAN HOSPITAL

E. A. CODMAN — Tuesday, 10. Operations: Surgical. Demonstration of lesions about shoulder joint. Thursday, 10. Operations: Surgical. Demonstration of lesions of duodenum.

HOUSE OF THE GOOD SAMARITAN

DRS. SOUTTER, LEGG, and SEVER — Monday, Wednesday, and Friday, 10. Clinics: Infantile paralysis, muscle transplantation, flattened condition of the head of the femur, obstetrical paralysis.

TUFTS MEDICAL SCHOOL

A. W. GEORGE — Daily, 2 to 5. Demonstrations: Röntgenology.

MASSACHUSETTS CHARITABLE EYE AND EAR INFIRMARY

DRS. CROCKETT, MOSHER, and EMERSON — Monday and Friday. Otological clinic.
DRS. JACK, WALKER, POWERS, and BLODGETT — Tuesday. Otological clinic.
DRS. HAMMOND, WHITE, and FAUNCE — Wednesday. Otological clinic.
DRS. JACK, KNOWLES, TOBEY, and BOGAN — Thursday. Otological clinic.

Eye clinic daily from 9 to 12. Various operations on lids, tear sac, and muscles of the eye. Different types of operation for cataract and glaucoma. Magnet operations for the removal of foreign bodies from the eye. Different methods of using local anæsthesia. Tuberculosis of the eye. Interstitial keratitis of specific origin. Ophthalmia neonatorum and gonorrheal ophthalmia in adults. Localization of foreign bodies in the eye by the X-ray. Demonstration of ophthalmometer for measuring astigmatism of the lens. Demonstration of lantern slides by pathological department.

BOSTON DISPENSARY

H. M. CHASE and H. F. DAY — Surgical clinic.
JOHN ADAMS — Orthopedic clinic.
HENRY J. PERRY and ARTHUR H. CROSBY — Genito-urinary clinic.

FORSYTHE DENTAL INFIRMARY

FRED B. LUND — Monday, 9. Surgical operations.
HARRY H. GERMAIN — Tuesday, 9. Surgical operations.
HUGH WILLIAMS — Wednesday, 9. Surgical operations.
HUGH CABOT — Thursday, 9. Surgical operations.
WILLIAM E. CHENERY and LOUIS ARKIN — Daily, 10. Nose and throat clinic.
L. M. S. MINER — Tuesday, 2. Oral surgery.
HARRY B. SHUMAN — Wednesday, 2. Oral surgery.
ALBERT L. MIDGLEY — Thursday, 2. Oral surgery.
DR. STROUT — Friday, 2. Oral surgery.
ALBERT KINLEY, JR. — Daily, 11 and 2. Radiography.
WILLIAM A. GOBIE — Daily, 11 and 2. Extracting clinic.
WILLIAM Z. HILL — Daily, 9 and 2. Operative dental clinics.
FRANK A. DELABARRE — Daily, 9. Orthodontia clinic.

Research Laboratory will be open from 9 to 12 and 2 to 4 daily. Exhibition of pathological and bacteriological specimens.

HARVARD MEDICAL SCHOOL

PROFS. COUNCILMAN and MALLORY — Demonstration: Pathology.
PROFS. CANNON and W. T. PORTER — Demonstration: Physiology.
PROF. FOLIN — Demonstration: Chemistry.
PROF. STRONG — Demonstration: Tropical Medicine.
PROF. REID HUNT — Demonstration: Pharmacology.
DRS. ORDWAY and TYZZER — Demonstration: Cancer research.
JOHN WARREN — Demonstration: Anatomy.
W. F. WHITNEY — Demonstration: Warren anatomical museum.
F. T. LEWIS — Demonstration: Embryology.
J. E. GOLDTHWAIT — Demonstration: Visceroptosis.